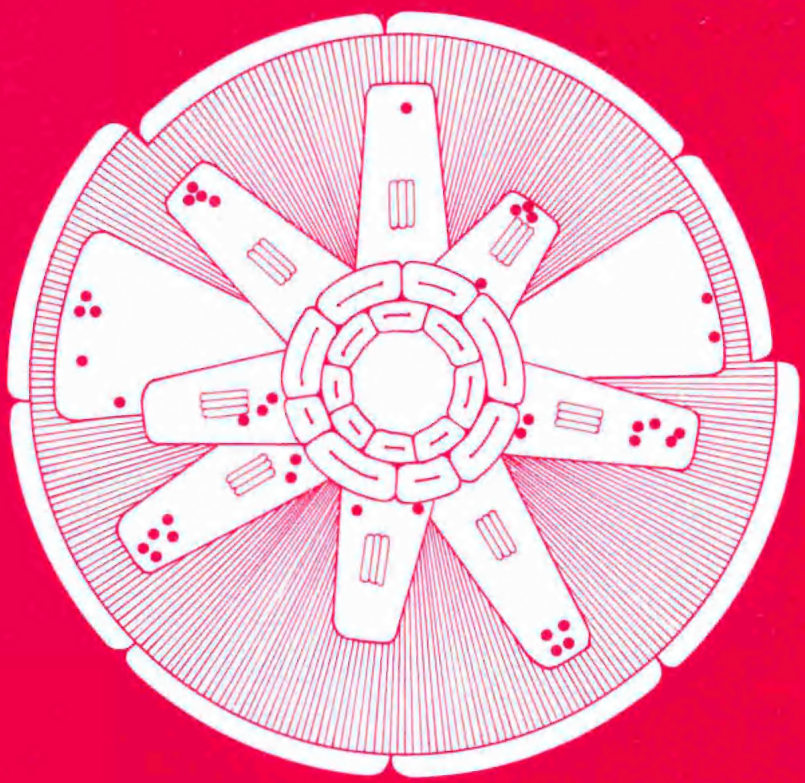
VOLUME 3

NUMBER 2 1990

AUSTROBAILEYA

A JOURNAL OF PLANT SYSTEMATICS



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DEPARTMENT OF PRIMARY INDUSTRIES
QUEENSLAND GOVERNMENT ISSN 0155-4131

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Austrobaileya

Vol. 1, No. 1 was published on 1 December 1977

Vol. 3, No. 1 was published on 12 October 1989

Austrobaileya is published once per year.

Exchange: This journal will be distributed on the basis of exchange.

Subscriptions: Orders for single issues and subscriptions may be placed. The price is (1990) A$20 per issue for individuals, A$35 for institutions, including postage.

All correspondence relating to exchange, subscriptions or contributions to this journal should be addressed to The Editor, *Austrobaileya*, Queensland Herbarium, Department of Primary Industries, Meiers Road, Indooroopilly, Q. 4068, Australia.

ISSN 0155-4131

Austrobaileya 3(2): 173–329 (1990)

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ARGOPHYLLUM VERAE (SAXIFRAGACEAE), A NEW SPECIES FROM NORTHERN QUEENSLAND

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Summary

***Argophyllum verae* sp. nov. occurs on Cape York Peninsula in northern Queensland. A key and comparative table to distinguish it from other species of *Argophyllum* in Australia is given.**

During botanical exploration of the area between Moreton Telegraph Station and Temple Bay, Cape York Peninsula, I collected flowering material of a species of *Argophyllum*. Subsequent comparison of this material with collections of *Argophyllum lejourdanii* F. Muell., *A. nullumense* R. Baker or *A. cryptophlebum* Zemann held at the Queensland Herbarium or Australian National Herbarium, Atherton, showed that it is specifically distinct from all previously known species of *Argophyllum* from Australia; nor can it be matched with any taxa described by Zemann (1907) in her revision of the genus.

Argophyllum verae P. Forster **sp. nov.** affinis *A. lejourdanio* F. Muell. sed margine foliorum integro, sepalis 2.3–2.5 mm longis, petalis 2.2–2.3 mm longis indumento denso intus, ratione longitinis petali sepalo 0.9–1.0, filis staminum c. 1 mm longis et basi ovarii valde papillata differt. **Typus**: 1 km N of Maloney's Springs, 12°27′S, 142°55′E, 19 June 1989, *P.I. Forster* 5285 & *M.C. Tucker* (holo: BRI (3 sheets); iso: CANB,K,MEL,MO,P,QRS).

Erect perennial shrub to 3 m tall. Stems to 3 cm diameter, with dense indumentum of white hairs. Leaves alternate, ovate, up to 15 cm long and 7.5 cm wide, tip acuminate, base cuneate, margins undulate, entire or very occasionally with small isolated teeth c. 0.5 mm long; discolourous, upper surface green with isolated to sparse indumentum of white hairs, lower surface with dense indumentum of white hairs giving a white appearance; secondary veins 10 on each side of midrib, tertiary veins prominently raised below. Inflorescence axillary, up to 3 cm long, but not extending beyond the leaves, with dense indumentum of white hairs on axes and perianth parts; peduncle up to 5 mm long, 1.4–1.5 mm diameter; bracts linear-lanceolate, 0.5–1 mm long, 0.4–0.5 mm wide, with dense indumentum of white hairs. Flowers 3.8–4.2 mm long, 3.5–3.8 mm diameter; pedicels 1–1.6 mm long, c. 1 mm diameter, with dense indumentum of white hairs. Receptacle 1.5–1.6 mm long, 3.5–3.8 mm wide, with dense indumentum of white hairs. Sepals 5, triangular-acute, 2.3–2.5 mm long and c. 1.7 mm wide, with dense indumentum of white hairs. Corolla cream; petals lanceolate, 2.2–2.3 mm long, 1–1.1 mm wide, incurved over top of stigma, with dense indumentum of white hairs both externally and internally. Anthers c. 0.8 mm long and 0.6 mm wide. Filaments c. 1 mm long, lowest c. 0.6 mm fused to middle of sepal-base. Styles 2, c. 0.7 mm long, style-head 0.6–0.7 mm diameter. Ovaries 4, fused in flower, c. 2.5 mm long, 2.8–3 mm diameter, lowest c. 0.6 mm strongly papillate; each ovary 2.4–2.5 mm long, 1.5 mm wide, becoming brown at maturity and the whole splitting apart to release the seeds. Seed globose to somewhat reniform, brown, 0.5–0.6 mm long, c. 0.4 mm wide, with reticulate surface patterning.

Specimens examined: Thus far known only from the type collection.

Distribution and habitat: Maloney's Springs occurs at the southern end of the Glennie Tableland on far northern Cape York Peninsula, an area of raised sandstone clifflines and gorges. The main vegetation communities in the area are open eucalypt forest on sandy soils and palm-dominated rainforest communities on the bottom of sandstone gorges where there is permanent running water. The population of *A. verae* occurs on narrow sandstone ledges next to the open eucalypt forest and overlooking the rainforest-inhabited gorges. Plants may be intolerant of fire as none were observed on ledges where there was evidence of past fires. Other plants noted in close proximity included *Gardenia*

psidioides (which is also restricted to the general area), *Spermacoce* sp. (*Forster* 5291), *Acacia calyculata*, *Lamprolobium fruticosum*, *Anthobolus filifolius*, *Stylidium* sp. (*Forster* 5295), *Dodonaea polyandra* and *Welchiodendron longivalve*.

Notes: The only known population of *A. verae* occurs at least 500 km to the north-north-west of the nearest populations of *A. lejourdanii* which appears to be its closest relative in Australia on gross morphological grounds (**Table 1**). *A. lejourdanii* also grows on open rock platforms, but these are predominantly of granite or slate. *A. verae* appears to be the only species in the Glennie Tableland area that is restricted to the sandstone clifflines, as other associated species occur also in the adjoining plant communities.

Table 1. Comparison of morphological characters for Australian species of *Argophyllum*.

Character	*A. verae*	*A. nullumense*	*A. cryptophlebum*	*A. lejourdanii*
leaf shape	ovate	oblong-elliptic	ovate	oblong-elliptic to ovate
secondary vein number per side of midrib	10	9–12	5–7	9–13
tertiary veins	raised	obscure	obscure	raised
petiole length (mm)	25–30	10–15	15–20	20–25
leaf teeth	± absent	present	present	present
leaf teeth number	0–3	5–8	11–17	9–54
sepal length (mm)	2.3–2.5	1–1.5	0.9–1.0	1.2–1.5
petal length (mm)	2.2–2.3	3.7–4	2.8–4	2.5–3
petal:sepal length ratio	0.90–1.0	2.7–4	3–4	2–2.1
ovary number	4	2 or 3	2 or 3	2 or 3

Conservation status: *A. verae* is known only from the type locality where 10–20 mature plants were present. One small seedling was seen. Examination of other sandstone clifflines in the vicinity of Maloney's Springs and on the eastern side of the Glennie Tableland did not reveal further populations; however it is to be expected that further populations exist in the Glennie Tableland sandstones. A conservation coding of 1K (Briggs & Leigh 1988) is accorded this species.

Etymology: *A. verae* is named for Vera Scarth-Johnson, the well-known botanical artist and plant collector of Cooktown. Vera has contributed many specimens both to the Queensland Herbarium and the Royal Botanic Gardens, Kew, England.

Fig. 1. *Argophyllum verae*. Flowering branch × 0.5. From Forster 5285 & Tucker.

Key to Australian species of *Argophyllum*

1. Leaf margins entire, or with occasional minute tooth; petal:sepal length ratio 0.9–1; ovaries 4 . . . . . **A. verae**
   Leaf margins toothed; petal:sepal length ratio 2–4; ovaries 2–3 2

2. Leaf teeth 5–8 on each side of lamina; petiole length 8-16 mm . . . . **A. nullamense**
   Leaf teeth 9–54 on each side of lamina; petiole length 15–25 mm 3

3. Secondary veins per side of midrib in leaf blade 5–7; petal:sepal length ratio 3–4 . . . . . **A. cryptophlebum**
   Secondary veins per side of midrib in leaf blade 9–13; petal:sepal length ratio 2–2.1 . . . . . **A. lejourdanii**

Acknowledgements

I would like to thank Ted Youngman of "Bromley" for permission to botanise on his property, D.J. Liddle, G. Kenning, M.C. Tucker and G. Sankowsky for assistance on the trip, P.R. Sharpe for translating parts of Zemann's paper, R.J. Henderson for correcting the latin diagnosis and the Directors of BRI and QRS for making available collections and facilities.

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Accepted for publication 1 Feburary 1990

Austrobaileya 3(2) 177–202: 1990

AESCHYNOMENEAE (BENTH.) HUTCH. (LEGUMINOSAE) IN AUSTRALIA

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Summary

The tribe Aeschynomeneae has been revised. Seven genera, *viz Aeschynomene* L. (6 species), *Arachis* L. (1 species), *Cyclocarpa* Afzelius ex Urban (1 species), *Ormocarpum* P. Beauv. (1 species), *Smithia* Aiton (2 species), *Stylosanthes* Swartz (5 species) and *Zornia* J. Gmelin (17 species), occur in Australia. With the exception of *Zornia* (discussed previously) all genera are dealt with in this paper. All taxa are described and keys to the subtribes, genera and species (in each genus) and distributional maps of the species are provided. No new taxa are described in this account.

***Aeschynomene*, *Arachis* and *Stylosanthes* have been introduced into Australia (some probably from pre European times) and have become naturalised. *Arachis* was introduced for its fruits and *Aeschynomene* and *Stylosanthes* for trials as pasture legumes.**

AESCHYNOMENEAE

Tribe **Aeschynomeneae** (Benth.) Hutch., Gen. Fl. Pl. 1: 470 (1964).

Tribe Hedysareae subtribe Aeschynomeninae Benth. in Benth. & Hook., Gen. Pl. 1: 448 (1865).
Rudd in Polhill & Raven, Adv. Legume Syst. 1: 347–354; 349, f. 1; 351, f. 2 (1981).

Herbs, shrubs or rarely small trees, sometimes glandular punctate with pellucid dots or with tubercular-based (hispid) hairs, or glandular hairs. Leaves alternate, 2- or 3-foliolate, or pari- or imparipinnate; leaflets alternate or opposite. Stipules attached at their base, or peltate and appendaged below point of attachment into a basal spur; stipels absent. Inflorescences axillary or terminal, racemose, spicate, paniculate, fasciculate or subcymose, or flowers solitary; bracteoles paired, rarely absent. Calyx campanulate with 5 subequal lobes, or bilabiate with the vexillary lip entire or 2-fid, the carinal lip entire or 3-fid. Petals clawed, standard elliptic, orbicular or obovate, entire or emarginate; wings often transversely plicate; keel incurved. Stamens 10, filaments connate into a sheath, often splits above into 2 lateral bundles of 5; anthers uniform, rarely dimorphic (Stylosanthinae and Poiretiinae), dorsifixed, versatile or basifixed. Ovary mostly stipitate; style filiform; stigma small, terminal. Fruits jointed, straight, curved or plicate; articles indehiscent or rarely dehiscent; rarely fruits unjointed and geocarpic (*Arachis*); seeds reniform, ovoid, oblongoid or ellipsoid, with a small hilum.

Twenty five genera, in tropical and warm temperate countries. Seven genera occur in Australia, three of these, *viz Aeschynomene*, *Arachis* and *Stylosanthes* have been introduced and have become naturalised.

Four of the five subtribes recognised by Rudd (1981), *viz* Aeschynomeninae, Ormocarpinae, Poiretiinae and Stylosanthinae are represented in Australia. Only Discolobiinae is not represented here.

Key to the subtribes and genera in Australia

1. Pellucid dots or pustular glands usually present on stems, leaves, stipules and bracts. Inflorescences spiciform with numerous stipule-like bracts enclosing the flowers. Flowers sessile; ebracteolate. Fruit articles reticulate-veined, ornamented with glands or bristles. Leaves 2-foliolate **Zornia** 4.* (subtribe Poiretiinae)

   Pellucid dots absent. Inflorescence not as above. Flowers sessile or pedicellate; bracteolate. Fruit articles without glands or bristles, smooth, striate or reticulate-veined. Leaves 3–many-foliolate 2

2. Stipules usually adnate to the petiole at the base. Leaflets 3 or 4. Calyx tube (hypanthium) long and filiform bearing petals and stamens at apex; upper 4 calyx lobes connate, lower free 3
Stipules not adnate to the petiole. Leaflets 5–many, pari- or imparipinnate. Calyx tube short, campanulate with 5 subequal lobes, or bilabiate with entire or 2- or 3-fid lips 4

3. Leaves 3-foliolate. Fruits 2-articulate, small, beaked, not geocarpic. Flowers composed of 1-flowered spikes placed in axil of primary bracts, lower most in axil of ordinary leaf, each flower accompanied by a secondary bract and 1 or 2 bracteoles . . . . . **Stylosanthes**
3.* (subtribe Stylosanthinae)
Leaves 2-paired. Fruits not jointed, large, geocarpic. Flowers in short, sessile spikes, each flower subtended by 2 bracts . . . . . **Arachis**
3.* (subtribe Stylosanthinae)

4. Fruits curved into a ring, or plicate. Stipules appendaged below point of attachment into an unequally bilobed spur; one lobe of spur long and attenuate, acuminate, the other short and erose 5
Fruits linear and long, straight or slightly curved. Stipules basally attached, or appendaged below point of attachment into an unlobed spur 6

5. Fruits curved into a ring, not enclosed in the calyx. Bracts and bracteoles membranous. Inflorescences umbelliform racemes. Leaflets 3- or 4-paired . . . . . **Cyclocarpa**
1.* (subtribe Aeschynomeninae)
Fruits plicate, enclosed in the calyx. Bracts and bracteoles scarious. Inflorescences subumbellate or scorpoid cymes or racemes. Leaflets (3–)5–11-paired . . . . . **Smithia**
1.* (subtribe Aeschynomeninae)

6. Articles ± quadrate, hemispherical or ± globose, finely reticulate veined. Calyx tube campanulate with 5 subequal lobes, or bilabiate with entire or 2- or 3-fid lips. Leaves pari- or imparipinnate, not fasciculate on young shoots . . . . . **Aeschynomene**
1.* (subtribe Aeschynomeninae)
Articles narrow and elongate, ellipsoid, with strong continuous nerves on sides. Calyx tube campanulate, 5-lobed, 2 upper ones joined to about half-way, lower lobe the longest. Leaves imparipinnate, often fasciculate on young shoots . . . . . **Ormocarpum**
2.* (subtribe Ormocarpinae)

Note: 1. Throughout the following account, the calyx is measured from the base to tip of the lobes, and the length of the stipules, bracts and petals include the spur or claw.

2. In the list of specimens examined, only the institutions from which duplicates are seen are cited.

Subtribe 1. AESCHYNOMENINAE

Subtribe **Aeschynomeninae** Rudd in Polhill & Raven, Adv. Legume Syst. 1: 352 (1981).

Leaves without pellucid dots, usually sensitive, 5–many-foliolate, pari- or imparipinnate. Flowers pedicellate. Calyx tube campanulate with 5 subequal lobes, or bilabiate with entire or 2- or 3-fid lips. Ovary stipitate, conspicuously jointed. Articles of fruit finely reticulate veined.

Eight genera, three in Australia (*Aeschynomene*, *Cyclocarpa* and *Smithia*).

* Denotes the order in which the subtribes occur in the following account.

Aeschynomene

Aeschynomene L., Sp. Pl. 2: 713 (1753). **Type**: *A. aspera* L.
Benth., Fl. austral. 2: 226–227 (1864); Bailey, Qd Fl. 2: 406–408 (1900); Rudd, Contr. U.S. Natl Herb. 32(1): 1–124 (1955), J. Wash. Acad. Sc. 49(2): 45–52 (Feb 1959), Reinwardtia 5(1): 23–36 (Jun 1959); Verdc., Fl. Trop. E. Afr. Legum.-Pap. 3: 364–406 (1971).*
* with illustration.

Derivation of name: from Greek *Aischynomene* (modest, ashamed) the name given by Pliny to some plants with sensitive leaves.

Herbs or shrubs; usually hispid. Leaves pari- or imparipinnate; leaflets subopposite or alternate, small, entire or serrulate, 1–3-nerved, usually sensitive. Stipules paired, membranous or foliaceous, striate, basally attached or appendaged below point of attachment into a basal spur, usually persistent. Inflorescences axillary or terminal, few-flowered, open, racemose or ± paniculiform, rarely flowers solitary; bracts mostly striate, persistent; bracteoles paired, appressed to calyx, striate, deciduous. Calyx campanulate, with 5 subequal lobes, or deeply bilabiate, upper lip entire or 2-fid, lower usually 3-dentate. Standard elliptic, obovate or orbicular, abruptly shortly clawed, entire or emarginate; wings obovate-oblong attenuate into a short claw, straight or ± falcate, usually with a lateral spur and small pockets on its blade; keel ± obovate, incurved, the lobes usually partly joined. Staminal tube split into 2 groups of 5, filaments free half-way, anthers uniform, dorsifixed. Ovary linear, sessile or stipitate, style persistent, stigma capitate. Fruits subsessile or stipitate, linear or oblong, cuspidate (remnant style), lower margin usually crenate, (1–)2–18-articulate; articles subquadrate, ellipsoid or semiorbicular, laterally compressed, reticulate veined, smooth or tuberculate, indehiscent or dehiscent by lower sutures. Seeds reniform or oblong, smooth.

About 150 species, mainly in tropical America and Africa, with a few in Asia, New Guinea and Australia. Six species in Australia, all probably naturalised.

Aeschynomene is distinguishable by the long, linear, articulated pods, sensitive leaves with usually many small leaflets and few-flowered, lax, open inflorescences.

J. Vogel's (1838) division of the genus into two sections, is retained here.

Section 1. *Aeschynomene* L. – Stipules spurred. Calyx bilabiate.

Section 2. *Onchopodium* J. Vogel – Stipules basally attached. Calyx campanulate; lobes 5, subequal.

Rudd (1955), recognised five series under sect. *Aeschynomene* and three series under sect. *Onchopodium*. Two series *viz* ser. *Americanae* (with 2 species) and ser. *Indicae* (with 2 species) of sect. *Aeschynomene*, and one series *viz* ser. *Viscidulae* (with 2 species) of sect. *Onchopodium* occur in Australia.

The species in Australia are sometimes difficult to separate when not in fruit and a whole series of characters have been used in the following key to differentiate them.

Key to the species

1. Stipules with a basal appendage. Calyx deeply 2-lipped. Leaves 12–112-foliolate; leaflets usually narrowly oblong, sometimes ±falcate 2
(section *Aeschynomene*)
Stipules not with a basal appendage. Calyx campanulate, with 5 subequal lobes. Leaves 5–12-foliolate; leaflets obovate or elliptic oblong 5
(Section *Onchopodium*)
(series *Viscidulae*)

2. Leaflets with 1 main nerve (midvein), not falcate . . . . . 3 (series *Indicae*)
   Leaflets with 2 or 3 conspicuous longitudinal nerves, usually ± falcate . . . . . 4 (series *Americanae*)

3. Fruits 1–5-articulate; articles 10–15 × 7.5–9 mm, margins verrucose at maturity. Flowers 12–18 mm long. Leaves (20–)44–112-foliolate. Stipules prominently 6–11-nerved, not hyaline margined. Stems thick and spongy . . . . . **1. A. aspera**
   Fruits (3–)6–10-articulate; articles 3–5.5 × 3–5 mm, the centres only verrucose at maturity. Flowers 7–9 mm long. Leaves 8–22-foliolate. Stipules obscurely 3–5-nerved, hyaline margined. Stems slender or thick and fistular, not spongy . . . . . **2. A. indica**

4. Ovary and fruit glabrous or puberulous. Fruits spreading ± falcate, upper margin ± entire, lower ones deeply indented between seeds; joints between articles short; articles semiorbicular, thick-walled. Leaves 26–60-foliolate; leaflets 6–14.5 mm long, usually 3-nerved. Flowers purple . . . . . **3. A. americana**
   Ovary villous. Fruits deflexed, hispid, not falcate, slightly indented on both margins; joints as long as articles; articles globose or ellipsoid, thin-walled. Leaves 16–38-foliolate; leaflets 4–9 mm long, 2- (or 3)-nerved. Flowers usually yellow . . . . . **4. A. villosa**

5. Stems with fine appressed hairs only. Leaves 5–9-foliolate; petiole and rachis 3–15 mm long. Stipes of fruits (2.5–)4.5–7.5 mm long . . **5. A. brevifolia**
   Stems with spreading hispid hairs, as well as glandular hairs and ± curved fine hairs. Leaves 9–12-foliolate; petiole and rachis (8–)15–21 mm long. Stipes of fruits 2–3(–6) mm long . . . . . **6. A. micranthos**

Section 1. Aeschynomene L. **Type:** *A. aspera* L.

Stipules appendaged below point of attachment into a spur at base. Calyx deeply bilabiate, upper lip 2-fid or entire, lower one 3-dentate.

Five series, two, *viz* series *Americanae* (2 species: *A. americana* and *A. villosa*) and series *Indicae* (2 species: *A. aspera*, *A. indica*), in Australia.

Series *Indicae* Rudd, Contr. U.S. Natl Herb. 32(1): 55 (1955). **Type:** *A. indica* L.

Leaves 1-costate.

1. **Aeschynomene aspera** L., Sp. Pl. 2: 713 (1753). **Type:** Ceylon, *P. Herman* (*n.v.*). Rudd, Reinwardtia 5: 29–30 (1959); Backer & Bakh., Fl. Java 1: 600 (1963).

   A. aspera var. *oligartha* F. Muell., Vict. Nat. 8: 136 (1892). **Type:** Port Darwin, Northern Territory, in 1891, *N. Holtze* 1332 (holo: MEL).

Robust erect herbs to 1.25 m high; stems thick and spongy at base, hispid. Leaves (20–)44–112-foliolate; petiole and rachis 6–22 cm long, sparsely hispid or glabrous; petioles pulvinate at base; leaflets linear oblong, 7–16 × 1.5–3 mm (upper and lower leaflets smaller); apex obtuse, subacute or ± truncate, mucronate; base subobtuse, oblique; margins entire ciliate; midrib usually black, lateral nerves obscure; petiolules to 0.5 mm long. Stipules basally spurred, narrowly ovate, 8–19 × 1.5–3 mm, prominently 6–11-nerved; spur short, truncate or erose. Inflorescences racemose, 1–3-flowered, peduncles 0.6–3 cm long, hispid; bracts ovate-cordate, acuminate, 3–5 × 2–3 mm, obscurely 5-nerved, glabrous or hispid, ciliate. Flowers 1.2–1.8 cm long; pedicels 5–10 mm long, hispid; bracteoles ovate, obtuse, 2–2.5 × 1–2 mm, hispid, nerves obscure. Calyx 2-lipped, 8–10 mm long, conspicuously striate; lips ovate, one entire or retuse, sparsely hispid, the other 3-dentate. Petals yellow; standard obovate, 11–15 × 14–17 mm, glabrous except hairy upper margins; wings 12.5–16 mm long; keel 14–17.5 × 7–9 mm. Stamens 15–20

mm long, filaments alternately long and short. Fruits linear-oblong, 4.2–6.1 cm long, margins crenulate, smooth, very strongly verrucose at maturity; (1–)3–5-articulate; articles subquadrate, 10–15 × 7.5–9 mm, hispid, ± rugose at centre (at maturity); stipes 0.9–2 cm long, hispid. **Fig. 1A.**

Specimens examined: Northern Territory. Port Darwin, in 1891, *Holtze* (MEL); Bullkine Billabong, Wagait Reserve, 12°55′S, 130°33′E, Apr 1981, *Dunlop & Craven* 5917 (DNA); Approx. 5 km N of Nathan River Stn, May 1985, *Leach* 617 (DNA). **South Australia.** Charlotte Waters, in 1887, *Byrne* (MEL). **Queensland.** COOK DISTRICT: About 200 m E of Watson River about 27 km upstream from Arukun, May 1982, *Clarkson* 4381 (BRI,DNA); N of Silver Plains towards Massey Ck, Aug 1978, *Kanis* 2033 (BRI).

Distribution and habitat: Native of South East Asia where it is widespread. Naturalised in Australia (**Map 1**) at the edges of water holes, in swampy areas and flood plains with their stems rooted in 10–50 cm of water.

A. aspera can be distinguished from other species in Australia by its large flowers; by the few large articles of the fruits and strongly verrucose margins of mature fruits; by the thick, spongy stems, and robust habit.

Uses: The pith is said to be used as a cork substitute in South East Asia.

Note: The var. *oligartha* F. Muell. is not retained here because the characters of the fruit used to distinguish the variety falls within the range of the typical variety.

2. Aeschynomene indica L., Sp. Pl. 2: 713 (1753). **Type:** Neli-Tali, Malabar, India: 31, t. 18, in Rheede Hort. Malab. 9 (1689).
Benth., Fl. austral. 2: 226 (1864); Bailey, Qd Fl. 2: 407 (1900); Domin, Biblioth. Bot. 89: 207 (1921); Rudd, Reinwardtia 5(1): 30 (1959); Verdc., Man. New Guinea Legumes 367; 369, f. 85 (1979).

For synonyms see Rudd *loc. cit.*

Erect, usually much branched herbs or subshrubs to 2 m high; stems slender, or thick and fistular towards base, sparsely hispid or glabrous. Leaves sensitive, 8–22-foliolate; petiole and rachis (2–)5–10.5 cm long, hispid; leaflets linear oblong, 3–12 × 1–3 mm, apex ± rounded, mucronate; base rounded, oblique; entire or serrulate; glabrous; midrib prominent, lateral nerves obscure; petiolules to 0.2 mm long. Stipules basally spurred, narrowly ovate or elliptic, acuminate, 5–18 × 1–3.5 mm, usually hyaline margined, obscurely 3–5-nerved; spur acute or erose. Inflorescences racemose, 0.6–2 cm long, 1–5-flowered, peduncles hispid; bracts ovate-cordate, acuminate, 2–6 × 1–2.5 mm, subentire or serrulate, obscurely nerved. Flowers 7–9 mm long; pedicels to 2 mm long, hispid; bracteoles ovate, 2–3 × 1–1.5 mm, subentire or serrulate, nerves obscure. Calyx 2-lipped, 4–6 mm long, lips narrowly oblong, one 2-fid, the other 3-dentate, glabrous, nerves absent. Petals yellow with orange flush; standard broadly elliptic, 6.5–9 × 4–6 mm; wings 6–7.5 mm long; keel 7–9 mm long. Stamens 7–9 mm long. Fruits linear oblong, 1.2–5 cm long, straight or slightly curved, upper margin straight, lower slightly crenate, 3–10-articulate; articles subquadrate, 3–5.5 × 3–5 mm, finely reticulate veined in the centre, sparsely hispid or glabrous; strongly rugose with ridges and tubercles at maturity; stipes recurved, 4–11 mm long, hispid or glabrous; seeds dark brown or black, 3 × 2 mm. **Fig. 1B.**

Selected specimens: Western Australia. Coondiner Pool, about 71 km N of Newman, Mar 1984, *Newbey* 10068 (PERTH); Bindoola Creek, 8.5 km WSW of Home Valley H.S., Mar 1978, *Lazarides* 8617 (BRI,DNA). **Northern Territory.** Tomahawk Soak, Utopia, Jun 1955, *Chippendale* 1204 (DNA); Stirling Stn, near 9 mile waterhole, Aug 1985, *Leach & Smith* 702 (DNA); Arnhem Highway, 19.5 km NW Nourlangie Ranger Stn, May 1980, *Craven* 5442 (DNA). **South Australia.** Callamurra Waterhole, Cooper Creek, 6 miles [9.6 km] E of Innamincka H.S., May 1966, *Smyth* 66 (AD). **Queensland.** COOK DISTRICT: 61 km S of Cooktown, Apr 1975, *Halliday* 397 (BRI). BURKE DISTRICT: Green Creek about 33 km NW on road to Normanton, Apr 1973, *Henderson* 1779 (BRI). NORTH KENNEDY DISTRICT: ± 12 km NW of Proserpine, Apr 1980, *Anderson* 2001 (BRI). GREGORY NORTH DISTRICT: Tranby, May 1936, *Blake* 11422 (BRI). WARREGO DISTRICT: 10 km SE of Charleville along Boatman Rd, Mar 1976, *Purdie & Boyland* 37 (BRI). PORT CURTIS DISTRICT: Rockhampton, Feb 1980, *Stanley* 541 (BRI). MORETON DISTRICT: Serpentine Ck, approx. 11 km NE of Brisbane, Jan 1973, *Durrington* 500 (BRI). **New South Wales:** Narran R. on Goodooga – Lightning Ridge Road, Mar 1978, *Wilson* 1793 (BRI).

Distribution and habitat: Native probably of South America (*fide* Rudd 1959), widespread in the tropics and subtropics. It is the most common *Aeschynomene* species in Australia, naturalised in northern Australia, eastern Queensland and New South Wales, also in South Australia (**Map 2**); usually in wet places e.g. flood plains, fresh water swamps and sandy banks near permanent water.

A. indica is distinguishable by the greenish colour of dried plants, by the numerous small oblong leaflets per leaf, and by the linear long fruits with (3–)6–10, ± quadrate articles which are brown and verrucose in the centre at maturity.

Common name: Budda pea

Uses: Used as a fodder for sheep and cattle. It is a troublesome weed of summer crops in Queensland.

Series *Americanae* Rudd, Contr. U.S. Natl Herb. 32(1): 22 (1955).
Type: *A. americana* L.

Leaves 2–several-costate.

3. Aeschynomene americana L., Sp. Pl. 2: 713 (1753). **Type**: Jamaica, *Sloane*, lecto: BM (*n.v.*)
Rudd, Contr. U.S. Natl Herb. 32(1): 23–30 (1955), Reinwardtia 5: 25 (1959); Verdc., Man. New Guinea Legumes 367 (1979).

Erect or rarely decumbent, hirsute, viscid subshrubs to 2 m high; usually densely hispid with pale or yellow hispid hairs with mostly dark tuberculate bases, sometimes subglabrous or with glandular hairs on stems, leaf axes, peduncles and pedicels. Leaves (26–)36–60-foliolate; petiole and rachis 2–4 cm long; leaflets linear oblong, subfalcate, (6–)7–11(–14.5) × 1–2 mm (upper ones smaller), apex oblique acute or obtuse, mucronate; base obtuse, ± oblique; serrulate towards apex; glabrous except ciliate margins, prominently 3-nerved with longitudinal nerves, often with 1 or 2 short faint ones near base; petiolules to 2 mm long. Stipules basally spurred, narrowly ovate, attenuate-acuminate, 11–21 × 1–2.5 mm, conspicuously 7–13-nerved, usually hispid at point of attachment only; spur acute or erose. Inflorescences open, racemose, 1.5–4.7 cm long, (2–)4–6-flowered; peduncles flexuose; bracts ovate-cordate, acuminate, 3–5 × 2–4 mm, serrate, hispid. Flowers 5–7 mm long; pedicels filiform, 4–7 mm long; bracteoles narrowly ovate, acute or acuminate, 2–4.5 × 0.5–1 mm, margins serrate, hispid. Calyx bilabiate, 4.5–5 mm long, usually thin with faint nerves; lips narrowly ovate, ciliate, one lip entire or 2-fid, the other 3-dentate. Petals mauve brown or purple, or with purple streaks; standard orbicular, 6–6.5 × 4–5 mm, apex ciliate; wings 6–7 × 2–2.5 mm; keel 6–7 × 2.5–3 mm. Stamens 5–7 mm long, staminal sheath divided to about middle. Ovary glabrous or sparsely hairy or ciliate. Fruits spreading, arcuate linear, subfalcate, 2–3 cm long, upper margins ± entire, lower deeply indented between seeds, with narrow, short definite articulations between articles, (3–)5–7-articulate; articles semiorbicular, 2.5–4 × 3–5 mm, ± thick walled, finely reticulate veined (prominent near margins), puberulent or glabrous, verrucose in centre at maturity; stipe to 2 mm long, glabrous. **Fig. 1C.**

Specimens examined: Northern Territory. Berrimah Farm, 12°26′S, 130°55′E, May 1981, *Rankin* 2587 (BRI,CANB,DNA); Darwin, May 1984, *Rankin* 2930 (CANB). **Queensland.** BURKE DISTRICT: Cliffdale Stn airstrip, Nicholson River area, W of Burketown, Apr 1985, *Johnson* (BRI). NORTH KENNEDY DISTRICT: Cordelia, May 1985, *Hoult* (BRI).

Distribution and habitat: Native of South America where it is widespread, and extending to tropical America. Naturalised in Indonesia, Philippines, New Guinea and northern Australia (**Map 3**); usually in dry areas along roadsides.

A. americana can be distinguished by the narrowly oblong subfalcate leaflets with an oblique apex and 3 longitudinal nerves; by the spreading, arcuate linear ± falcate fruits with deeply crenate lower margins and with short evident joints between (3–)5–7, semiorbicular articles. It is very closely related to *A. villosa* Poiret and the species are difficult to separate when not in fruit. The two species have been combined and *A. villosa* reduced under *A. americana* by Urban (1905) but they are retained as distinct species here because of the differences in fruits (see discussion under *A. villosa*).

Rudd (1955, pp. 24–27) recognised three varieties under *A. americana*. The plants naturalised in Australia are probably referable to the typical variety.

4. Aeschynomene villosa Poiret in Lam., Encyc. Meth. Bot. Suppl. 4: 26 (1886). **Type:** Puerto Rico, *Ledru* (*n.v.*).
Rudd, Contr. U.S. Natl Herb. 32(1): 32–37 (1955), Reinwardtia 5: 27–28 (1959); Verdc., Man. New Guinea Legumes 368 (1979).

[*A. americana* auct. non L.: F. Muell., Fragm. 12: 19 (1882); Bailey, Qd Fl. 2: 407 (1900), quoad specimene Endeavour River, *Persieh*]

Herbs to 1 m high with decumbent stems, usually densely viscid-hispid with yellow or brown hairs on stems, leaf axes, peduncles and pedicels, or subglabrous. Leaves (16–) 22–30(–38)-foliolate; petiole and rachis 1–4 cm long; leaflets narrowly elliptic-oblong, ± falcate, (4–)6–8(–9) × 1–2.5 mm (upper ones smaller); apex oblique, acute, mucronate; base obtuse or ± rounded; margins entire or slightly serrulate towards apex; glabrous; prominently 2- (or 3)-nerved with longitudinal nerves, often with 1 or 2 short faint ones near base; petiolules to 0.2 mm long. Stipules basally spurred, narrowly ovate, acuminate, (6–)8–16 × (0.5–)1–2 mm, prominently 5–7-nerved, glabrous; spur truncate or erose. Inflorescences open, racemose or paniculate, (1.5–)3–10 cm long, 2–6 (–9)-flowered; bracts ovate-cordate, acuminate, 2–6 × 1–2 mm, 7–13-nerved, hispid-ciliate. Flowers 4–5 mm long; pedicels 2–4 mm long; bracteoles narrowly ovate, acuminate or acute, 1–3 × 0.5–1 mm, 3–7-nerved, hispid-ciliate. Calyx bilabiate, 3–4 mm long, ± membranous, nerves not apparent; lips narrowly ovate, one 2-dentate, the other 3-dentate. Petals yellow; standard suborbicular, 4–5 × 2–3 mm; wings 4–4.5 × 1–1.5 mm; keel 3–5 × 1–1.5 mm. Stamens 4–5 mm long, staminal sheath deeply divided into two. Ovary densely villous. Fruits deflexed, ± oblong, (0.6–)0.9–2 cm long, slightly indented between seeds on both margins, pale brown with darker margins and dark tuberculate bases of hispid hairs; (1–)3–5(–7)-articulate, joints between articles nearly as long as the articles; articles subglobose or ellipsoid, 2.5–3.5 × 3–4 mm, thin-walled, hispid; margins thick often breaking away from the body of the articles; stipes 1–3 mm long, hispid. **Fig. 1D.**

Selected specimens: Western Australia. 19 km SE of East Wyndham – Kununurra Rd, Jul 1974, *Carr* 3232 and *Beauglehole* 47010 (PERTH); Port Warrender, Mitchell Plateau, Jun 1976, *Kenneally* 5258 (PERTH). **Northern Territory:** Burns Rd, Berry Springs, May 1953, *Rankin* 2716 (DNA); Katherine Gorge National Park, Apr 1977, *Dunlop* 4512 (DNA); Fish River H.S./Gorge area, Jun 1974, *Maconochie* 2008 (CANB, DNA). **Queensland.** Cook District: 6 miles [9.6 km] from Petford on Herberton Rd, Apr 1962, *McKee* 9425 (CANB). Burke District: Old Corinda Outstation, NW of Doomadgee, May 1974, *Pullen* 9082 (CANB). North Kennedy District: Bodalla, 40 km N of Pentland, May 1989, *Glenwright* 316 (BRI).

Distribution and habitat: Native of South America, where it is widespread, and ranges from Central America to northern South America. Naturalised in old world tropics including South East Asia, New Guinea and northern Australia (**Map 4**); usually along roadsides, creeks and lagoons, in moist soil.

A. villosa is recognisable by the hispid stems and fruits and also by the narrowly oblong subfalcate leaflets with oblique apex and prominent 2 or 3 longitudinal nerves. It is very closely related to *A. americana* L. which has similar leaves and indumentum and the two species are difficult to distinguish when not in fruit.

The two species have been combined by Urban (1905). He reduced *A. villosa* as a variety under *A. americana*, and was followed by several authors. But Rudd (1955) in her revision of the American species of *Aeschynomene*, retained *A. villosa* as a distinct species and recognised three varieties under it. The latter is followed here because of the differences of the fruits and also because the specimens available for study of the two species were too few to ascertain their range of variation.

The Australian plants are probably referable to var. *villosa*, although the leaflets are usually longer than allowed in var. *villosa* and approach var. *longifolia* (Micheli) Rudd, but differ from the latter in the character of the inflorescence.

Section 2. Onchopodium J. Vogel, Linnaea 12: 86 (1838). **Type**: *A. falcata* (Poiret) DC.

Stipules attached by their base; basal appendage absent. Calyx campanulate, lobes 5, subequal.

Three series, only series *Viscidulae* (2 species: *A. brevifolia* and *A. micranthos*) in Australia.

Series *Viscidulae* Rudd, Contr. U.S. Natl Herb. 32(1): 71–72 (1955). **Type**: *A. viscidula* Michx.

Stems prostrate or suberect; leaflets mostly obovate; fruits small; articles 2–5.5 mm diameter.

5. Aeschynomene brevifolia L.f. ex Poiret* in Lam., Encyc. 4: 451 (1797). **Type**: Madagascar, 1770–71, *P. Commerson* (*n.v.*).
DeCandolle, Prod. 2: 322 (1825); Rudd, Contr. U.S. Natl Herb. 32(1): 88 (1955), J. Wash. Acad. Sc. 49 (2): 45: 47 (1959).

A. falcata var. *paucijuga* Benth., Fl. austral. 2: 221 (1864) p.p.; Bailey, Qd Fl. 2: 407 (1900) p.p.; Domin, Biblioth. Bot. 89: 208 (1921) p.p.

[*A. falcata* auct. non (Poiret) DC.: F. Muell., Fragm. 12: 20 (1882) p.p.]

Slender tufted herbs with prostrate (rarely ascending) stems to 30 cm long; stems with fine appressed hairs, sometimes subglabrous. Leaves 5–9-foliolate; petiole and rachis (7–) 8–17 mm long, hispid; petioles (3–)5–6(–12) mm long; leaflets obovate or ± elliptic oblong, 5–8(–12) × 2.5–4(–5) mm, apex ± truncate, rounded, mucronate; base ± truncate, unequal; glabrous above, finely appressed hairy below, ciliate; conspicuously lateral nerved and reticulate veined; petiolules to 0.5 mm long. Stipules basally attached, ovate acuminate, 1.5–4 × 0.5–1.5 mm, striate, sparsely hairy. Inflorescences usually racemose, 3–5.5 cm long, 3- or 4-flowered; peduncles 0.8–2.1(–5) cm long, sparsely hispid; bracts ovate or subelliptic, acute, 1.5–2 × 1–1.5 mm, ciliate, striate. Flowers 7–8 mm long; pedicels 3–6.5 mm long, hispid; bracteoles elliptic or narrowly ovate, 1–2 × 0.5–1 mm, striate. Calyx campanulate, 3–3.5 mm long, finely appressed hairy outside; lobes 5, subequal, ovate. Petals yellow; standard suborbicular, 7 × 6–7 mm; wings 6–7 × 1.5 mm; keel 6 × 2 mm. Stamens 5 mm long. Ovary densely appressed hairy. Fruit 1- or 2(–5)-articulate, articles ± obloid or semiorbicular, sometimes with short necks between them, 3.5–4 × 4 mm, finely reticulate veined, sparsely appressed hairy or subglabrous; stipes (2.5–)3–4.5(–7.5) mm long, hispid.

Selected specimens: Queensland. NORTH KENNEDY DISTRICT: Rangeview about 30 miles [48 km] SE of Ravenswood, May 1954, *Everist* 5548 (BRI). SOUTH KENNEDY DISTRICT: Shaw Island, Nov 1985, *Batianoff* 3358 & *Dalliston* (BRI). PORT CURTIS DISTRICT: 8 miles [12.8 km] W of Biloela, Sep 1964, *Johnson* 2830 (BRI); Gladstone, *Dietrich* 13 (MEL); Middle Percy Island, Mar 1966, *Tryon* (BRI). BURNETT DISTRICT: Gayndah, Dec 1960, *Schoneveld* 317 (BRI). MORETON DISTRICT: Mt Urah, Apr 1983, *Sharpe* 3323 (BRI); Dinmore near Ipswich, Jan 1961, *Pedley* 735 (BRI); Walloon, *Bowmann* (MEL); Taylor Range, Jul 1843, *Leichhardt* (MEL).

Distribution and habitat: Native of Madagascar, probably naturalised in Queensland (**Map 3**); usually on rocky ridges and hillsides.

A. brevifolia is distinguishable by the fine appressed hairy stems, small leaves with small, obovate, prominently nerved leaflets and by the long stipes of the fruits. It is very similar to *A. micranthos* in the attributes of leaves and fruits but the latter species differs in having spreading hispid, as well as ± curved fine hairs on stems.

Typification: The type of *A. brevifolia* L.f. ex Poiret* is missing, the specimen in the type folder at PLA is *A. falcata* (Poiret) DC. (BRI microfiche). Nevertheless the specimens in Australia referred to as *A. brevifolia* are a good match with plants from Madagascar under that name, and also agree with available literature.

Notes on *A. brevifolia* complex: Plants from Queensland previously placed under *A. brevifolia* s. lat. are very variable with at least two taxa present, *viz* one with fine appressed hairs on the stem (treated here as typical *A. brevifolia* s. str.) and the other taxon with coarse spreading hispid hairs (some of these sometimes gland-tipped), as well as fine ± curved hairs (referred here to *A. micranthos*). Typical *A. brevifolia* resembles *A. falcata* (Poiret) DC., differing in the characters of the fruit, while *A. micranthos* approach some of the forms under the very variable *A. brasiliana* (Poiret) DC. Identification of these species (*A. brevifolia* s. lat., *A. brasiliana* and *A. falcata*) is therefore difficult, because similar looking plants can be found under these names.

* The correct author citation for *A. brevifolia* should be L.f. ex Poiret not L. ex Poiret, because it was the younger Linneaus who saw Commerson's collections from Madagascar and probably named the plant (*fide* his (Linneaus) letter to his friend Claes Alstroemer, April 1781, in Smith Herbarium (BRI microfiche)).

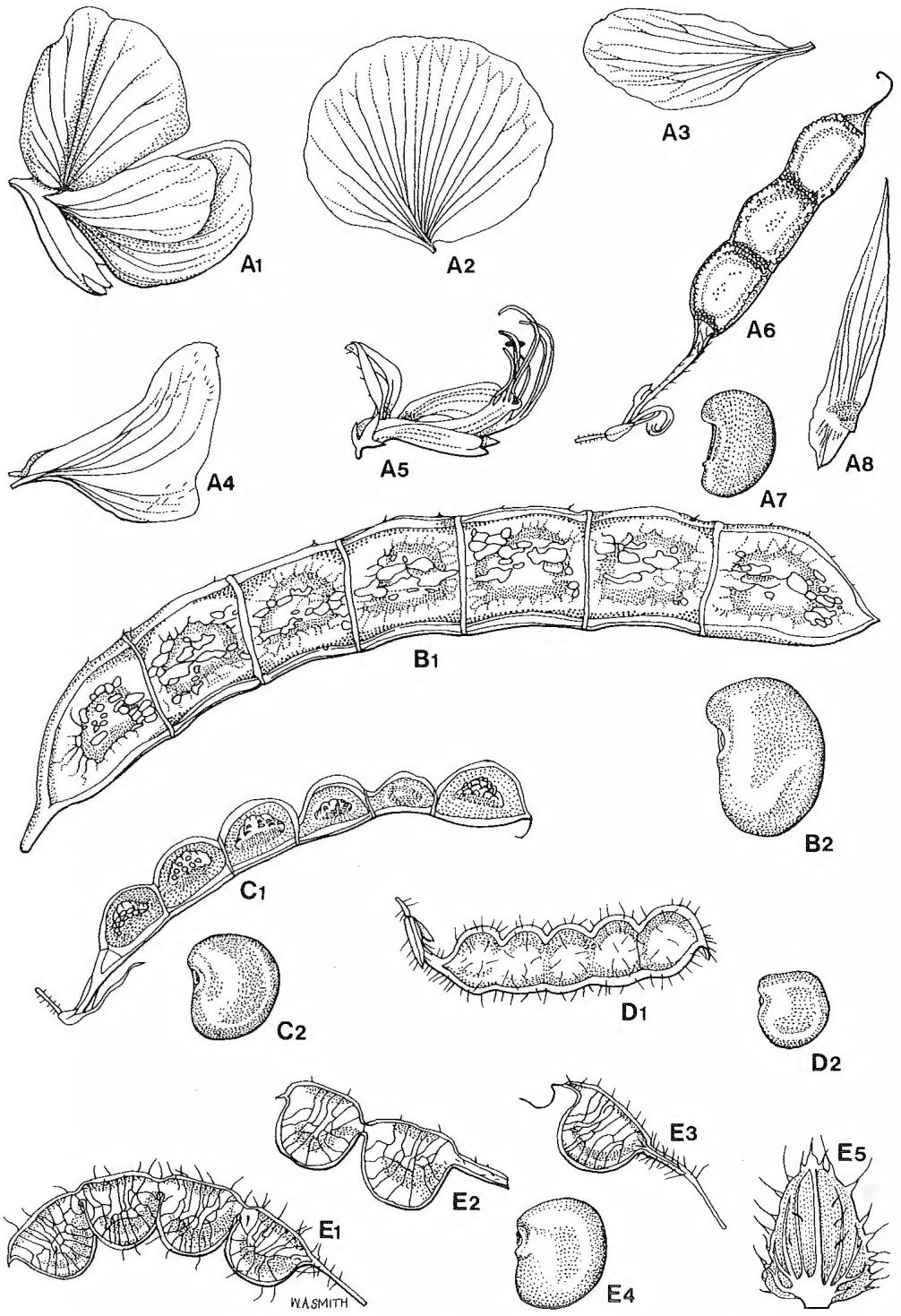


Fig. 1. *Aeschynomene* spp.: A. *A. aspera*: A_1. flower × 2; A_2. standard × 2; A_3. wing × 2; A_4. keel × 2; A_5. calyx and stamens × 2; A_6. fruit × 1; A_7. seed × 2; A_8. stipule × 2. B. *A. indica*: B_1. fruit × 3; B_2. seed × 6. C. *A. americana*: C_1. fruit × 3; C_2. seed × 6. D. *A. villosa*: D_1. fruit × 3; D_2. seed × 6. E. *A. micranthos*: E_1, E_2, E_3. fruit × 3; E_4. seed × 6; E_5. stipule × 12. A, Dunlop & Craven 5917; B, Gittens 720; C, Johnson 4207; D, Maconochie 2008; E, Anderson 3637.

A. brasiliana (Poiret) DC. and *A. falcata* (Poiret) DC. have been cultivated in Australia for a very long time but as yet not reported to be naturalised. Yet in the past both names have been applied to naturalised Australian species. Confusion existed from the time of Bentham; he considered the Australian plants to be the same as the South American ones under *A. falcata* var. *paucijuga* Benth. (1864, p. 227). He reduced *A. micranthos* (Poiret) DC. from Madagascar under it. But Rudd (1955, p. 88) placed *A. falcata* var. *paucijuga* Benth. under *A. falcata* var. *falcata*. She placed the Australian species under *A. brevifolia* L.f. ex Poiret (1959, p. 47) and reduced *A. micranthos* under it. Following Rudd, the Queensland specimens were previously placed under *A. brevifolia* s. lat. Although the plants look very similar with similar fruits and leaves, they have been segregated in this account because of the differences in stem indumentum (as indicated above) into *A. brevifolia* and *A. micranthos*. Their differences from closely related *A. falcata* and *A. brasiliana* are indicated in the following key which is based on available material and literature.

1. Stems with fine appressed hairs only. Leaves 5–9(–10)-foliolate. Stipes 2.5–14 mm long 2

   Stems with spreading hispid hairs as well as glandular hairs and also ± curved fine hairs. Leaves (8–)9–18-foliolate. Stipes 0.5–6 mm long 3

2. Fruits falcate, (4–)5–7-articulate. Stipes 6.5–14 mm long. Petioles short (2–5 mm long). Leaves 8–10-foliolate; leaflets mostly oblong-elliptic, obtuse, 8–12 × 3–5 mm. Pedicels appressed hairy . . . . . **A. falcata**

   Fruits not falcate, 1–5-articulate. Stipes 2.5–7.5 mm long. Petioles longer ((3–)5–6(–12) mm long). Leaves 5–9-foliolate; leaflets mostly obovate, ± truncate or obtuse, 5–8(–12) × 2.5–4(–5) mm. Pedicels with spreading hispid hairs . . . . . **A. brevifolia**

3. Petiole with rachis 1.5–4.5 cm long. Leaves (9–)12–18-foliolate; leaflets (8.5–)12.5–18 × (4.5–)6–10 mm, obtuse or rounded. Stems viscid-hispid, usually densely hispid and glandular hairy. Fruits 2- or 3-articulate, articles 2–4 mm long; stipes 0.5–2(–3) mm long . . . . **A. brasiliana**

   Petiole with rachis 0.8–2.1 cm long. Leaves 8–10(–12)-foliolate; leaflets 4.5–11.5 × 2.5–5.5 mm, ± truncate or obtuse. Stems with dense or sparse hispid hairs and very few glandular hairs . . . . . **A. micranthos**

6. Aeschynomene micrantha (Poiret) DC., Prod. 2: 321 (1825); *Hedysarum micranthos* Poiret, Encyc. Meth. Bot. 6: 446 (1804). **Type**: Madagascar, in 1770–71, *P. Commerson* (holo: P-JU (BRI: microfiche)).

Rudd, J. Wash. Acad. Sc. 49(2): 47–48 (1959); Verdc., Kirkia 9(2): 443 (1974).

A. falcata var. *paucijuga* Benth., Fl. austral. 2: 227 (1864) p.p.; Bailey, Qd Fl. 2: 407 (1900); Domin, Biblioth. Bot. 89: 208 (1921) p.p.

[*A. falcata* auct. non (Poiret) DC.: F. Muell., Fragm. 12: 20 (1882) p.p.]

Slender tufted herbs, with prostrate (rarely ± ascending) stems to 50 cm long; stems densely or sparsely coarsely hairy with spreading, long or short hispid hairs (sometimes gland-tipped) intermingled with fine ± curved hairs. Leaves 9–10(–12)-foliolate; petiole and rachis (8–)15–21 mm long, hispid; petiole 5–9 mm long; leaflets subobovate, 4.5–11.5 × 2.5–5.5 mm; apex obtuse, rounded or subtruncate, mucronate; base truncate or subcordate, oblique; glabrous above, sparsely appressed hairy below, ciliate; conspicuously lateral nerved and reticulate veined; petiolules to 0.5 mm long. Stipules basally attached, ovate or narrowly ovate, acuminate, 2–5 × 1–1.5 mm, striate, puberulous, sparsely ciliate. Inflorescences racemose, 2.3–8 cm long, (1–)2–4-flowered, peduncles 1.6–3(–4.5) cm long, hispid; bracts ovate, acute or acuminate, 1.5–3.5 × 0.5–2 mm, striate, puberulous. Flowers 7–10 mm long; pedicels (2.5–)6–9 mm long, hispid; bracteoles elliptic, 1.5–2.5 × 1 mm, striate, puberulous. Calyx campanulate, 3.5–4.5 mm long, sparsely pilose on outside; lobes 5, subequal, ovate. Petals yellow or orange-yellow; standard suborbicular, 6.5–10 × 6–8 mm; wings 6–9 × 2.5–3 mm; keel 7–9 × 2 mm. Stamens 6–10 mm long. Ovary densely hispid. Fruits 1- or 2(–4)-articulate; articles semiorbicular or oblongoid, 4–5 × 3–3.5 mm, finely reticulate veined, sparsely hairy with fine appressed hairs and hispid hairs; stipes 2–3(–6) mm long, hispid. **Fig. 1E.**

Specimens examined: Queensland. COOK DISTRICT: Tinaroo Ck Rd, about 15 km SE of Mareeba, Apr 1972, *Staples* 030472/3 (BRI); *Brown's Ck above Blackdown Stn., Jan 1971, *MacDonald* 19 (BRI). NORTH KENNEDY DISTRICT: Herbert River, Rockingham Bay, May 1868, *Dallachy* (MEL); Ewan, Nov 1930, *Millar* (BRI); Taravale near Hell Hole Ck, 0.5 km E of homestead, Mar 1987, *Jackes* 8221A (BRI); Cape Pallaranda, Feb 1980, *Stanley* 80146 (BRI); *Pentland, Apr 1935, *Blake* 8401 (BRI). SOUTH KENNEDY DISTRICT: Bowen River, *Bowman* 279 (MEL). PORT CURTIS DISTRICT: Between Broadsound and Thirsty Sound, inner entrance, Sep 1802, *Brown* (BRI); 60 km NW of Yarwun, Mt Larcom Range, Mt Larcom, May 1988, *Gibson* 142 (BRI). MITCHELL DISTRICT: Torrens Ck, Mar 1933, *White* 8698 (BRI). LEICHHARDT DISTRICT: *about 15 km WNW of Duaringa, Feb 1984, *Anderson* 3637 (BRI).

* indicates a very hairy form approaching some forms of *A. brasiliana* (Poiret) DC.

Distribution and habitat: Madagascar, Mozambique, South Africa and Australia. Probably naturalised in Queensland before 1802 (it was collected by R. Brown in 1802) (**Map 1**); usually in flat plains amongst granite boulders, in dry river beds creeping on stones, and on low dissected hills, in skeletal or sandy soil.

A. micranthos is distinguishable by the spreading hairy, hispid stems, small obovate leaflets and 1–4-articulate fruits on long stipes.

Typification: The type specimen has not been seen to study the stem indumentum (microfiche at BRI). Nevertheless the Australian plants placed under *A. micranthos* agree in other characters with microfiche of the type and with plants from South Africa under this name; they also agree with available literature and are probably correctly named.

Note: *A. micranthos* (as discussed under *A. brevifolia*) was reduced under *A. falcata* var. *paucijuga* Benth. (now *A. falcata* var. *falcata*), by Bentham (1864, p. 227), and under *A. brevifolia* L.f. ex Poiret by Rudd (1959, p. 47), but has been retained as a distinct species in this account because of the differences in stem indumentum and also because it is doubtful that Poiret would have made a mistake and described the same plant twice, even after 6 or 7 years (although these things are said to have happened before).

Smithia

Smithia Aiton, Hortus Kew. ed. 1(3): 496, t. 13 (1789) *nom. cons.*
Type: *S. sensitiva* Aiton
Benth., Fl. austral. 2: 227–228 (1864); Bailey, Qd Fl. 2: 408 (1900); van Meeuwen, Reinwardtia 5(4): 443–446 (1961); Rudd in Polhill & Raven, Adv. Legume Syst. 1: 352, f. 2.11 (1981).

Derivation of name: after James Edward Smith (1759–1828), one of the most famous of British botanists.

Herbs or subshrubs. Leaves paripinnate; leaflets opposite, 1-nerved, subsessile; stipules appendaged below point of attachment into an unequally bilobed spur, membranous, striate, persistent; one lobe of spur linear and long, acuminate, the other short, ± truncate or erose. Inflorescences axillary, usually short densely flowered subumbellate or scorpoid cymes or racemes; bracts small, slightly peltate, scarious, brownish, finely striate; bracteoles 2, usually scarious, finely striate, persistent. Calyx scarious, deeply 2-lipped, finely striate, upper lip entire, lower one toothed. Standard ± obovate or suborbicular, usually emarginate; wings free, oblong, laterally spurred and with a series of small pockets on its blade; keel elliptic, united dorsally, free at apex, with a short lateral spur above claw. Stamens united to about 2/3 their length, filaments alternately long and short; anthers uniform, dorsifixed. Disk short. Ovary sessile or shortly stipitate, linear, one margin straight, the other crenate, 2–7-ovuled; style curved; stigma small. Fruits stipitate, plicate, included in the persistent accrescent calyx, 2–7-articulate; articles obovoid or semiorbicular with the broader sides against each other, warty, glabrous; margins smooth or tuberculate; indehiscent. Seeds reniform, compressed.

Thirty species, tropical Africa, Madagascar, New Guinea and Australia; two in Australia.

Smithia is characterised by the plicate fruits and scarious bracts. The leaves are similar to those of *Aeschynomene* L., but the fruits are linear and long, straight or falcate, bracts not scarious, and the inflorescence open and lax in the latter genus.

1. Flowers sessile, in a head-like inflorescence ..... **1. S. conferta**
Flowers pedicellate, in a long peduncled raceme ..... **2. S. sensitiva**

1. Smithia conferta Smith, Rees Cycl. 33: 2 (1816). **Type**: not designated.
Benth., Fl. austral. 1: 228 (1864); Bailey, Qd Fl. 2: 408 (1900); Van Meeuwen, Reinwardtia 5(4): 445 (1961); Backer & Bakh., Fl. Java 2: 600 (1963); Verdc., Man. New Guinea Legumes 370–371 (1979).

S. capitata Desvaux, J. Bot. 1: 121 (1813) *nom. nud.*

Herbs or subshrubs with spreading, decumbent stems to 1 m, glabrous except bristly leaves. Leaves (6–)10–14-foliolate; petiole 1–2 mm long; rachis 7–17 mm long, with sparse long bristles; leaflets narrowly oblong, elliptic or obovate, 7–12 × 1.5–3(–3.5) mm; apex acute or obtuse; base obtuse, or ± truncate, unequal; margins entire or finely remotely serrulate and bristly; glabrous above, sparsely appressed hispid hairy below; petiolules tumid to 0.5 mm long. Stipules (7–)9–16 × 1.5–2.5 mm, striate, glabrous, upper lobe ovate, acute or acuminate; one lobe of spur long, narrowly ovate acuminate, the other short erose. Inflorescences a leafy head, 1.5–2.5 × 1.7–3.2 cm, comprising of 2–4 flowers in clusters in axil of ordinary (upper) leaves congested into a leafy head; bracts ovate, aristate, 3–3.5 × 2 mm, glabrous. Flowers 7–9 mm long; sessile; bracteoles ovate-elliptic, cuspidate, 4–5 × 2–2.5 mm, sparsely bristly outside. Calyx 6–8 mm long, lips 5–7 × 3–4 mm, narrowly ovate, upper one acuminate, glabrous except for few hairs at apex, lower lip acute, 2-toothed, sparsely long hairy near apex and along the midrib. Petals yellow, standard obovate, 9–10 × 4–5 mm (claw 1.5–2.5 mm long); wings oblong, 8–9 × 1.5 mm (claw 1.5–2.5 mm long); keel obovate, 7–8 × 1.5–2 mm (claw 2–2.5 mm long). Stamens 7–8 mm long. Ovary linear, 3–5-ovuled, glabrous. Fruit 3–5-articulate, articles 1.5–2 × 1.5–2 mm, ± rugose or verrucose; seed brown, smooth, 1–1.5 × 1–1.5 mm.

Selected specimens: Northern Territory. Port Darwin, in 1889, *Holtze* 983 (MEL); Nangalala, May 1972, *Reeve* 244 (CANB); 25 miles [40 km] S Giddy River crossing, Jun 1972, *Byrnes* 2675 (DNA); Koongarra area, May 1978, *Dunlop* 4586 (CANB). **Queensland.** COOK DISTRICT: 4.5 km E of Arukun – Beagle North Camp road, 6–8 km south of Cowplace Ck, Jun 1982, *Clarkson* 4452 (BRI); Hammond Island, Jul 1974, *Heatwole* 252 (BRI); Lockerbie, 10 miles [16 km] WSW of Somerset, Apr 1948, *Brass* 18487 (BRI). BURKE DISTRICT: Wellesley Island, Jun 1963, *Tindale & Aitken* (BRI). NORTH KENNEDY DISTRICT: Townsville, *Pollock* [AQ237539] (BRI).

Distribution and habitat: Tropical Asia, New Guinea and northern Australia (northern Queensland and Northern Territory) (**Map 5**); in subcoastal plains, near swamps, margins of lagoons, creek and river banks, in damp sandy soil in *Melaleuca* or *Pandanus* forests.

S. conferta is recognisable by the congested head-like inflorescences subtended by young leaves with long bristles.

2. Smithia sensitiva Aiton, Hort. Kew. ed. 1(3): 496 (1789). **Type**: not designated.
van Meeuwen, Reinwardtia 5: 444 (1961); Backer & Bakh., Fl. Java 1: 600 (1963); Verdc., Man. New Guinea Legumes 370; 372, f. 86 (1979).

Tufted diffuse herbs with decumbent, glabrous stems to 60 cm. Leaves (8–)12–22-foliolate; petiole 1–2 mm long; rachis 1–3 cm long; leaflets narrowly oblong or subobovate, 5–11 × 1.5–3.5 mm (upper ones usually smaller), apex obtuse, mucronate, rarely acute or ± truncate; base obtuse or ± truncate; remotely finely serrulate and bristly, upper surfaces glabrous, lower ones with scattered bristles; petiolules to 0.5 mm long. Stipules 7–17 × 1–2.5 mm, glabrous, striate, upper lobe ovate acuminate; one lobe of spur long, linear, acuminate, the other short truncate. Inflorescences in the axil of well spaced leaves, long peduncled racemes, 3–5 cm long, (1–)2–5-flowered; peduncles (0.6–)3–6 cm long, filiform, glabrous, with flowers crowded at their tips; bracts ovate, aristate, 3–6 × 1.5–2 mm, glabrous. Flowers 5.5–7 mm long; pedicels 1–3 mm long, glabrous; bracteoles ovate or ovate-elliptic, 2.5–4 × 1.5–2 mm, cuspidate or acuminate, glabrous. Calyx 5–8 mm long, lobes 4–6 × 3 mm, narrowly elliptic or subobovate, acute or obtuse, glabrous, striate. Petals yellow often tinged with red; standard broadly obovate, (6–)7–8 × 4–6 mm (claw 1–2 mm long); wings oblong, 6.5–7.5 mm long (claw 1–2 mm long); keel elliptic, incurved, 6–7 mm long (claw 1.5–2 mm long). Stamens 6–8 mm long. Ovary 4–8-ovuled, glabrous. Fruits 5–7 mm long, 4–7-articulate; articles 1–1.5 × 2 mm, tuberculate; seeds reddish brown, about 1.5 × 1–1.5 mm. **Fig. 2A.**

Selected specimens: Queensland. COOK DISTRICT: Euramo Plains, Jun 1938, *Langdon* (BRI). NORTH KENNEDY DISTRICT: Preston near Proserpine, *Michael* [AQ 237551] (BRI). MORETON DISTRICT: Mt Coolum, Mar 1945, *Clemens* (BRI); Yaroomba about 3 km S of Coolum Beach, 100 m W of Marakari Drive, Mar 1983, *Sharpe* 3296 (BRI); Moreton Island, Mar 1973, *Durrington* 343 (BRI).

Distribution and habitat: Africa, New Guinea and Australia (chiefly coastal Queensland) (**Map 5**); usually grows in wet sandy peaty soil at edge of swamps or in damp places along roads.

S. sensitiva is distinguished by the long stalked inflorescences with the flowers clustered towards tip of the long peduncles.

Cyclocarpa

Cyclocarpa Afzelius ex Urban*, Jahrb. bot. Gart. Berlin 3: 248 (1884). **Type**: *C. stellaris* Afzelius ex Urban*.
J.G. Baker in Oliver, Fl. Trop. Afr. 2: 151 (1871); Urban, Jahrb. Bot. Gart. Berlin 3: 248 (1884); Backer & Bakh., Fl. Java 1: 645 (1963); Verdc., Fl. Trop. E. Afr. Legum. -Pap. 3: 406–407, f. 57 (1971); Rudd in Polhill & Raven, Adv. Legum. Syst. 1: 351, f. 2.16; 353 (1981).

Derivation of name: from Greek *Cyclos* (circle); *carpos* (fruit), apparently after the round (in a circle) fruits.

Small herbs. Leaves sensitive, paripinnate; leaflets opposite, 3 or 4 paired, small; stipules appendaged below point of attachment into unequally bilobed spur, membranous; one lobe of spur long, linear acuminate, the other short erose. Inflorescences axillary, few-flowered umbelliform racemes; bracts and bracteoles small, membranous. Flowers pedicellate. Calyx bilabiate, hardly tubular at base, deciduous, lips entire or 2- or 3-fid. Standard obovate, emarginate; wings and keel finely denticulate at apex, wings oblong obovate, oblique, with small pockets; keel obliquely obovate. Stamens connate, the tube splits unilaterally for 1/2 its length into 2 bundles of 5, anthers uniform. Ovary subsessile, linear, falcate; style arcuate, stigma small, terminal. Fruit linear, curved into a ring or spiral, compressed, minutely warty on the margins (ridges); articles subdeltoid, reticulate veined, dehiscent, the sutures persisting after the fall of the segments; seeds small, ± reniform.

Monotypic genus widely distributed in the tropics of the Old World.

Cyclocarpa is distinguishable by the coiled pods, small pinnate leaves and leaflets, and also by the membranous stipules and bracts.

Cyclocarpa stellaris Afzelius ex Urban*, Jahrb. bot. Gart. Berlin 3: 248 (1884). **Type**: Sierra Leone near Freetown, *Afzelius* (*n.v.*).
Specht, Rec. Amer.-Austr. Expdn. Arnhemland 3: 242; 243, Pl. 3.B (1958); van Steenis, Reinwardtia 5(4): 419; 430–431 (1961).

C. stellaris Afzelius ex J.G. Baker in Oliver, Fl. Trop. Afr. 151 (1871), *nom. provis.*

Small tufted, erect or spreading, glabrous herbs (occasionally leaf axes sparsely hairy). Petiole 0.5–1 mm long; rachis 3–5 mm long, terminated by a long sharp mucro; leaflets obovate or ± oblong, 4–10 × 2–4 mm (upper leaflets larger), apex obtuse, rarely truncate, mucronate; base acute or obtuse; finely and remotely serrulate; petiolules 0.5 mm long. Stipules narrowly ovate, acuminate, (3–)5–8 × 0.5–1.5 mm long, 5–7-nerved. Inflorescences 1–4-flowered; peduncles 0.5–2 mm long; bracts narrowly ovate, acuminate, 1.5–2 × 1 mm. Flowers 4–5 mm long; pedicels 1.5–4 mm long; bracteoles ovate, 1–1.5 × 0.5–1 mm. Upper calyx lip oblong-obovate, 3–3.5 × 1.5–2.5 mm, margins ± truncate; lower one narrowly ovate, 4–5 × 1.5 mm, acuminate. Standard 3.5–4 × 3–3.5 mm (claw 0.5 mm long), yellow; wings 4–5 × 2 mm (claw 0.5–1 mm long); keel 4 × 2–3mm (claw 0.5–1mm long). Stamens 4–5 mm long. Fruits 5–10-articulate, 4–5 mm diameter; articles 1.5–2 × 2–2.5 mm, ± rounded or keeled, minutely warty on the ridges; seeds olive green, 1 × 1–1.25 mm. **Fig. 2B.**

* The correct authors for *Cyclocarpa* should be Afzelius ex Urban and not Afzelius ex J.G. Baker as indicated in some literature. J.G. Baker (in Oliver 1871) gave only a provisional description of a plant called *C. stellaris* by Afzelius, he did not describe the genus.

Selected specimens: Western Australia. Mitchell Plateau, 2 km N of camp, Apr 1982, *Keighery* 4793 (PERTH). **Northern Territory.** Munmulay Stn, Apr 1973, *Latz* 3923 (CANB,DNA); ditto, Mar 1982, *Dunlop & Taylor* 6238 (BRI,CANB,DNA); Berry Springs near Goose Lagoon, Apr 1978, *Rankin* 1224 (NT); about 10 miles (16 km) N Mudginbarry, May 1970, *Byrnes* 1915 (BRI,CANB,DNA); South Bay, Bikerton Island, Gulf of Carpentaria, Jun 1948, *Specht* 469 (AD,BRI,CANB). **Queensland.** COOK DISTRICT: Lockerbie, 10 miles (16 km) WSW of Somerset, Apr 1948, *Brass* 18448 (BRI,CANB). NORTH KENNEDY DISTRICT: Kelsey Ck, date unknown, *Michael* 949 (CANB). SOUTH KENNEDY DISTRICT: Koumala, Mar 1977, *Bishop* (BRI).

Distribution and habitat: Tropical Africa, South East Asia and northern Australia (**Map 6**); usually along streams and creeks, or in swampy forests in sandy soil.

Note: The leaves of *C. stellaris* resemble some species of *Aeschynomene* L. and also *Smithia* Aiton, but the former differs in the linear long, straight or falcate fruits, while the latter may be separated by its concertina-like fruits and scarious bracts and stipules.

Subtribe 2. ORMOCARPINAE

Subtribe **Ormocarpinae** Rudd in Polhill & Raven, Adv. Legume Syst. 1: 350 (1981).

Leaves not pellucid dotted, crowded on young shoots or well spaced, imparipinnate. Flowers pedicellate. Calyx campanulate, lobes 5 subequal or 2 upper ones joined to about middle, the lower lobe the longest. Ovary stipitate. Fruits usually with strong continuous nerves on sides.

Seven genera, only *Ormocarpum* occurs in Australia.

Ormocarpum

Ormocarpum P. Beauv., Fl. d'Oware et de Benin 1: 95, t. 58 (1807), *nom. cons.* **Type:** *O. verrucosum* P. Beauv.
Benth., Fl. austral. 2: 226 (1864); Bailey, Qd Fl. 2: 406 (1900); Backer & Bakh., Fl. Java 1: 598 (1963); Verdc., Fl. Trop. E. Afr., Legum. -Pap. 3: 352–364 (1971)*, Man. New Guinea Legumes 364–366 (1979)*; Rudd in Polhill & Raven, Adv. Legume Syst. 1: 350, f. 2.1 & 2 (1981).
* with illustration

Derivation of name: from Greek *Ormos* (a cord, chain); *carpos* (fruit), referring to the necklace like pods.

Shrubs or small trees with white weak deciduous hairs as well as stiff tuberculate-based hairs (bristles), the latter sometimes gland-tipped. Leaves fasciculate on young short shoots, or distichous, imparipinnate; leaflets alternate, entire. Stipules basally attached, striate, persistent. Inflorescences axillary, few-flowered short racemes or flowers solitary; bracts striate, persistent; bracteoles situated near base of the receptacle, paired, striate, persistent. Calyx campanulate, striate, unequally 5-lobed, lobes longer than tube, 2 upper ones ± connate, lower lobe the longest. Petals strongly veined; standard orbicular or broadly ovate, curved back, usually ridged above claw; wings obliquely obovate, slightly puckered above claw; keel broad, obovate ± incurved, obtuse or ± acute at apex, slightly attached along upper margins. Stamens united, the tube splits into 2 lateral fascicles of 5, anthers uniform. Ovary ± stipitate, style curved, stigma minute. Fruits linear, (1–)2–8-jointed, constricted between elongate articles; articles narrow, transversely ellipsoid, compressed, longitudinally ribbed; pericarp corky, indehiscent. Seeds ellipsoid, flattened.

About 20 species, tropical Africa, Madagascar, islands of the Pacific and northern Australia. One species in Australia.

Ormocarpum is distinguishable from other members of the tribe Aeschynomeneae in Australia, by its longitudinally ribbed fruits with elongate articles and short necks between articles. The plants are also small trees with usually large fasciculate or distichous leaves.

Ormocarpum orientale (Sprengel) Merrill, Intepr. Rumphius Herb. Amboin. 266 (1917); *Parkinsonia orientale* Sprengel, Syst. 4: 170 (1827). **Type**: Moluccus Island, *collector unknown* (*n.v.*).
Backer & Bakh., Fl. Java 1: 598 (1963); Verdc., Man. New Guinea Legumes 364; 366, f. 84 (1979).

Aeschynomene coluteoides A. Rich., Sert. Astrol. 87, t. 32 (1834). **Type**: Guam, Mariannas (*n.v.*).

O. sennoides var. *laevis* Benth., Fl. austral. 2: 226; Bailey, Qd Fl. 2: 406 (1900). **Type**: Endeavour River, *R. Brown* (*n.v.*).

[*O. sennoides* auct. non DC.: Benth., Fl. austral. 2: 226 (1864)].

Shrubs or small trees; branches drooping, glabrous, with whitish, loose flakey bark, striate, lenticellate. Leaves 9–13-foliolate; petiole 0.8–2.5 cm long; rachis 5–9 cm long; leaflets subobovate or oblong, (1.8–)2.7–4.5 × 0.9–1.8 cm, apex truncate, mucronate; base obtuse (acute in terminal leaflet); glabrous, ± glaucous below; finely lateral nerved and reticulate veined; petiolules 1–1.5 mm long. Stipules ovate, acuminate, (3.5–)5–12 × 2–3 mm. Racemes 2–4-flowered; bracts ovate, 2–3.5 mm long. Flowers 1.5–1.6 cm long; pedicels 1.9–2.5 cm long, filiform; bracteoles ovate, 1.5–3.5 mm long. Calyx tube 4–5 × 6–7 mm, lobes ovate, acute, lower acuminate, 4–8 mm long. Petals white or creamy yellow with purple streaks and transparent veins; standard 1.4–1.6 × 1.1–1.4 cm, shortly clawed (claw to 2.5 mm long); wings 1.2–1.3 cm long (claw to 5 mm long); keel 1.6–1.7 cm long, long clawed (claw 6–8 mm long). Stamens 0.8–1.8 cm long. Fruits 8.5–11.5 cm long, 2–8-articulate; articles 16–25 × 5–5.7 mm, strongly ribbed with raised, ± parallel ribs. **Fig. 2C.**

Specimens examined: Queensland. COOK DISTRICT: Endeavour River, date unknown, *Persieh* [AQ235633] (BRI).

Distribution and habitat: Indonesia, Solomon Islands, Vanuatu, New Guinea and northern Queensland (**Map 6**); usually in subcoastal forests in swampy areas, river banks and sandy seashores.

Note: This species appears to be poorly collected from Australia, the above being the only collection I have seen from here.

Subtribe 3. STYLOSANTHINAE

Subtribe **Stylosanthinae** (Benth.) Rudd in Polhill & Raven, Adv. Legume Syst. 1: 353 (1981).

Hedysareae subtribe Sylosanthinae Benth. in Benth. & Hook., Gen. Pl. 1: 449 (1865), as "Stylosantheae".

Leaves without pellucid glands, imparipinnate, 3(–9)-foliolate or 4-foliolate, sometimes with a pattern of tannin deposits on lower surfaces. Stipules free, or adnate towards the base of the petiole, then apiculate and bearing a leaf from the sinus. Flower sessile or subsessile in axil of bracts, or on a common axis, bracts and bracteoles then adjacent. Calyx tube (hypanthium) long and ± filiform, pedicel-like; petals and stamens inserted in throat of calyx. Ovary sessile or subsessile. Fruits usually jointed, but geocarpic and unjointed in *Arachis*, mostly with strong nerves on its sides.

Five genera, two *viz Stylosanthes* and *Arachis* occur in Australia.

Arachis

Arachis L., Sp. Pl. 2: 741 (1753). **Type**: *A. hypogea* L.
Bailey, Qd Fl. 2: 408 (1900); Rudd in Polhill & Raven, Adv. Legume Syst. 1: 354, f. 2.20 (1981).

Derivation of name: *Arachis* from *Arachidna* of earlier authors (*fide* Smith (1950) 809).

Herbs or low shrubs. Leaves paripinnate with 2 pairs of leaflets, rarely leaves trifoliolate. Stipules adnate to the lower part of petiole, membranous, striate, persistent, 2-lobed with acuminate apiculate lobes, bearing a leaf from the sinus. Inflorescences axillary; flowers sessile, congested in short dense sessile spikes; each flower subtended by a membranous bract and borne on a minute branch of inflorescence which is in the axil of a second bract; bracts keeled, lower one biapiculate with bristly tips, upper one entire, bristly or bifid. Calyx with a long and filiform tube (hypanthium) and 5 membranous lobes, upper 4 lobes connate, toothed, obtuse, the lower free, acute. Standard suborbicular, abruptly clawed; wings oblong or obovate with a lateral spur above the long claw; keel obovate, long clawed, incurved, apex acute, beaked; stamens monadelphous, anthers alternately

long and short, the long ones basifixed, short ones versatile. Ovary sessile; style filiform; stigma minute. Fruits geocarpic (pushed below the soil by the lengthening and reflexing of the gynophore which had stiffened to form a stalk), obloid, 1–5-seeded, constricted between seeds but not jointed, aseptate; walls thick and reticulate veined; indehiscent; seeds ovoid or obloid; cotyledons thick, fleshy, oily.

Twenty two species, mainly eastern South America. One species (*A. hypogea* L., the ground nut or peanut) is cultivated throughout the warmer parts of the world and has become naturalised in a few places including Australia.

Arachis is characterised by the 4-foliolate paripinnate leaves, membranous stipules adnate towards the base of the petiole and the geocarpic fruits.

Arachis hypogea L., Sp. Pl. 2: 741 (1753). **Type**: cultivated specimen, in Hort. Upsal., Sweden (LINN (Specimen No. 901.1), microfiche BRI), *fide* Verdc., Fl. Trop. E. Afr., Legum. -Pap. 3: 442 (1971).
Bailey, Qd Fl. 2: 408 (1900); Domin, Biblioth. Bot. 89: 208 (1921); Smith, Amer. J. Bot. 37: 802–815, f. 1–19 (1950); Verdc., Fl. Trop. E. Africa, Legum. -Pap. 3: 441–442, f. 63 (1971), Man. New Guinea Legumes 381–382, f. 89 (1979); Rudd in Polhill & Raven, Adv. Legume Syst. 1: 354, f. 2.20 (1981).

Herbs with ± erect stems; usually densely hispid with long spreading ± rusty hairs on stems and leaf axes. Leaves 4-foliolate; petiole and rachis broadly channelled above; petioles 2.5–5.5 cm long; rachis 0.8–2 cm long; leaflets opposite, obovate or ± elliptic, 2.5–6.7 × 1.4–3.6 cm, apex obtuse, truncate or emarginate; base obtuse or ± truncate, ± oblique; glabrous, or margins and lower surfaces sparsely pilose; lateral nerves 7–14-paired, oblique, prominent below; petiolules 1–2 mm long, densely villous. Stipules 2.8–3.5 × 0.8–1 cm; sheath finely hispid outside; lobes ± oblique, narrowly ovate or subtriangular, with long pointed tips, glabrous or ciliate. Inflorescences in the axil of lower leaves; flowers appearing solitary and stalked (calyx tube); lower bract ovate-lanceolate, with long pointed bristly tips, 10–12 × 4–5 mm; upper one narrowly ovate, entire, acuminate, bristly, 7–9 mm long. Calyx tube (hypanthium) long and slender, pedicel-like, 2.3–5 cm long, usually with dense long hispid hairs; lobes 7.5–8 mm long, sparsely hispid outside. Petals yellow, usually with red streaks; standard abruptly shortly clawed, 9–11 × 14 mm; wings 7–11 × 5 mm; keel incurved, 6–7 mm long. Stamens 7–8 mm long, tube fleshy, incurved; ovary densely villous towards the base. Fruits obloid, pale yellow, 2.2–3.8 × 1.2–1.8 cm, constricted but aseptate between the 2–4 seeds, glabrous. **Fig. 2D.**

Specimens examined: Queensland. Cook District: Endeavour River, in 1883, *Persieh* (MEL); Cooktown, *Parker* (AD 98572030). Wide Bay District: 4 miles [6.4 km] SW of Gympie on Mary Valley Rd, Mar 1958, *Marlow* (BRI). Moreton District: Old North Rd, Lawnton, 19 miles [30.4 km] N of Brisbane, Dec 1931, *Blake* 3085 (BRI).

Distribution and habitat: Native of South America (probably Brazil), grown throughout the warmer parts of the world for its fruits. Occasionally found as an escape from cultivation in a few countries including Australia (Queensland) (**Map 7**).

A. hypogea is recognisable by the 2-paired leaflets with prominent, closely arranged, ± parallel lateral nerves, hispid stems and leaf axes, and by the oblong, swollen, reticulate-ribbed pods.

Common name: Peanut or Ground nut.

Uses: The peanut is one of the chief economic plants of the world. It has been cultivated for centuries in South America and is now extensively grown in many countries for their fruits.

Stylosanthes

Stylosanthes Swartz, Prod. Veg. Ind. Occ. 108 (1788), Fl. Ind. Occ. 3: 1280, t. 25 (1806). **Type:** *S. procumbens* Swartz *nom. illeg.* = *S. hamata* (L.) Taubert (*Hedysarum hamatum* L.).
Mohl., Ann. Miss. Bot. Gard. 44: 299–354 (1958), Rhodora 65(763): 245–258 (1963); Verdc., Man. New Guinea Legumes 371–375 (1979); Burt & Willliams, A.M.R.C. Review No. 25 (1975); McVaugh, Fl. Novo-Galiciana, 5: Legum. 700–704 (1987).

Derivation of name: from Greek *Stylos* (pillar, column); *anthos* (flower) – column flower, alluding to the column-like calyx tube.

Herbs or subshrubs; usually hispid. Leaves pinnately 3-foliolate. Stipules adnate to lower part of petiole, biapiculate, bearing a leaf from the sinus, lobes aristate, bristly, sheath cylindrical, persistent. Inflorescences axillary or terminal, sessile, spicate or headlike, 1–many-flowered, composed of 1-flowered spikes placed in axil of primary bracts, the lowermost in the axil of primary leaf; primary (outer most) bracts sheathing, very imbricate, stipule-like, 1–3-foliolate; secondary ones ovate, 2- or 3-fid, hyaline, ciliate, persistent. Flowers sessile, each accompanied by a secondary bract, and 1 or 2 hyaline, linear, ciliate bracteoles and sometimes by a plumose filiform axis (axis rudiment) representing a reduced part of the inflorescence now absent. Calyx tube (hypanthium) long filiform, pedicel-like; lobes 5, membranous, ciliate, united at their base, upper 4 lobes, connate for about half their length, obtuse, lower one free, narrow, acute. Petals and stamens inserted in throat of calyx. Standard obovate or suborbicular, emarginate, shortly clawed; wings free, oblong or obovate, laterally spurred and with small pockets on its blade; keel incurved, appendaged (as the wing). Stamens monadelphous, tube splits into 2, anthers dimorphic, 5 anthers long and basifixed alternating with 5 short versatile ones. Ovary linear, subsessile, 2- (or 3)-ovuled; style curved, filiform, persistent, stigma minute. Fruits small, sessile, 2-articulate, both articles fertile, or lower abortive; upper ones mostly ± obloid, beaked (remnant style), laterally compressed, keeled, reticulate veined; seeds ovoid or ellipsoid, compressed.

About 25 species, mostly in South America, a few in tropical and warm temperature areas of the world. Several species have been introduced into Australia since 1900 (Burt & Williams 1975), five now naturalised.

Stylosanthes can be distinguished from other members of the tribe Aeschynomeneae by the 3-foliolate leaves, biapiculate stipules adnate to base of petiole; sessile, mostly dense inflorescences and by the very small fruits with short or long beaks.

J. Vogel (1838) divided the genus into two sections.

Section 1. *Stylosanthes* (as "*Eustylosanthes*"). **Type**: *S. viscosa* Swartz

Flowers not subtended by an axis rudiment. Inner bracteoles 1.

Section 2. *Styposanthes* J. Vogel, Linnaea 12: 68 (1838). **Type**: *S. hamata* (L.) Taubert

Flowers (at least the lower ones) subtended by an axis rudiment. Inner bracteoles 2.

Note: In the following account the species are not treated separately under their respective sections since only five species are naturalised in Australia, and because *S. humilis* Kunth can have the characters of both sections.

The species naturalised in Australia resemble each other closely, having similar habit, aspect, indumentum, leaves and flowers and are difficult to identify without fruits. A whole series of characters are therefore used in the following key to the species to separate them. Differences of closely related species are also discussed under the respective species.

Key to the species

1. Flowers not subtended by an axis rudiment. Inner bracteoles 1. 2
   Flowers (at least the lower ones) subtended by an axis rudiment. Inner bracteoles 2 4

2. Fruit beaks 3.5–7 mm long. Stems hairy on one side with lines of fine hairs; bristles scattered all over the stem. Leaflets not with a reticulate pattern of tannin on lower surfaces . . . . . **3. S. humilis**
   Fruit beaks 0.2–1 mm long. Stems either hairy all over, or only on one side with lines of fine hairs; bristles and glandular hairs present all over the stem, or absent. Leaflets with a reticulate pattern of tannin on lower surfaces 3

3. Stems densely hairy all over with fine hairs, glandular hairs and bristles. Fruits with 1 or 2 fertile articles; beaks strongly uncinate, to 1 mm long. Leaflets obtuse. Inflorescences narrow . . . . . **1. S. viscosa**
   Stems densely or sparsely bristly all over, and with lines of dense fine hairs on one side of stem, puberulous elsewhere, rarely glabrous, often glandular hairy. Fruits with 1 fertile article; beaks bent, to 0.5 mm long. Leaflets mostly acute. Inflorescences short and broad . . **2. S. guianensis**

4. Beak of fruits 1.5–2.5 mm long. Stems finely hairy and bristly all over; glandular hairs sometimes present. Leaflets obtuse usually with a reticulate pattern of tannin on lower surfaces . . . . . **5. S. scabra**
   Beak of fruits 3–7 mm long. Stems finely hairy on one side with lines of fine hairs; bristles scattered all over the stem or absent; glandular hairs absent. Leaflets acute or acuminate, not as above 5

5. Stems and bracts finely white hairy; bristles absent. Beak of fruits 3–5.5 mm long; both articles fertile. Axis rudiment persistent. Lateral nerves 5–7-paired, thick, very conspicuous . . . . . **4. S. hamata**
   Stems and bracts finely hairy as well as bristly. Beak of fruit 3–7 mm long; only upper article fertile. Axis rudiment deciduous. Lateral nerves 2- or 3- (or 4)-paired, slender, thickening only at their tips . . . . **3. S. humilis**

1. Stylosanthes viscosa Swartz, Prod. Veg. Ind. Occ.: 108 (1788). **Type**: not designated. Mohl., Rhodora 65 (763): 257, f. 27; 258 (1963); McVaugh, Fl. Novo-Galiciana, 5: Legum. 703 (1987)

Subshrubs or herbs with ascending stems to 0.5 m; usually viscid, and densely hairy with soft hairs, bristles and glandular hairs on stems, leaf axes, and stipules; glandular hairs denser on stems and leaf axes. Free part of petiole and rachis 9–12 mm long; leaflets elliptic, 8–13 × 3–6 mm, apex obtuse or subacute, mucronate; base obtuse or subacute; both surfaces finely hairy, lower surfaces also with scattered small bristles and glandular hairs (especially on midrib), and with a reticulate pattern of tannin; lateral nerves 3- or 4-paired, feeble ± inconspicuous, only thickening towards their tips (apex of leaflet with 3 prominent nerves, made up of the midrib (which extends to form a sharp mucro) and the tip of 2 top lateral nerves); petiolules to 0.5 mm long. Stipules 10–12 mm long, the sheath slightly longer than the teeth, 6–8 mm long, 5-nerved, finely hairy and bristly. Inflorescences narrow and long, 12–18 × 4–8 mm, 4–7(–16)-flowered; primary bracts 10–14 mm long, 1-foliolate (the leaflet nearly as long as in the ordinary leaf), finely hairy and bristly; secondary ones usually bilobed, 4–4.5 × 2 mm, ciliate; bracteoles 1, narrowly ovate, 3.5–4 × 0.7 mm, ciliate. Axis rudiment absent. Calyx tube 4–4.5 mm long, lobes to 2.5 mm long. Petals yellow with maroon stripes; standard 4.5–5 × 5 mm; wings 4–4.5 × 4 mm; keel 3–4 × 4 mm. Stamens 3–4 mm long. Fertile articles 1 or 2; upper ones 2.5 × 2 mm, shortly beaked, laxly reticulate veined, puberulent or papillose especially on the ridge; beak very strongly uncinate, about 1 mm long, shortly hairy; seeds 2 × 1.5 mm. **Fig. 2I.**

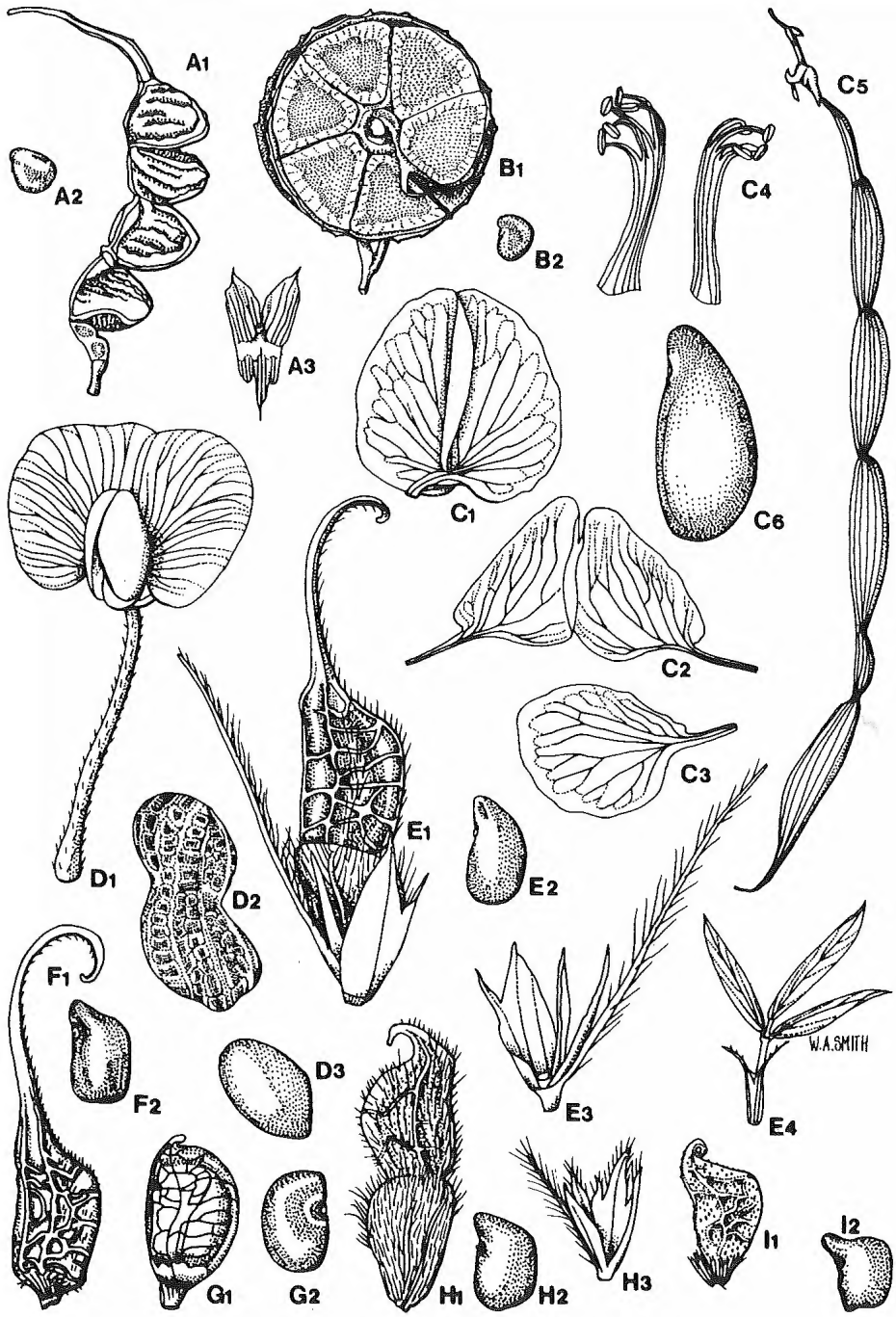


Fig. 2. A. *Smithia sensitiva*: A_1. fruit × 6; A_2. seed × 6; A_3. stipules × 2. B. *Cyclocarpa stellaris*: B_1. fruit × 6; B_2. seed × 6. C. *Ormocarpum orientale*: C_1. standard × 2; C_2. keels × 2; C_3. wing × 2; C_4. stamens × 2; C_5. fruit × 1; C_6. seed × 6. D. *Arachis hypogea*: D_1. flower × 2; D_2. fruit × 1; D_3. seed × 1. E–I. *Stylosanthes*: E. *S. hamata*: E_1. fruit × 6; E_2. seed × 6; E_3. part of the inflorescence × 6 showing (a) secondary bract (b) 2 bracteoles (c) axis rudiment; E_4. stipule × 1. F. *S. humilis*: F_1. fruit × 6; F_2. seed × 6. G. *S. guianensis*: G_1. fruit × 6; G_2. seed × 6. H. *S. scabra*: H_1. fruit × 6; H_2. seed × 6; H_3. part of inflorescence × 6, showing (a) secondary bract (b) 2 bracteoles, (c) axis rudiment. I. *S. viscosa*: I_1. fruit × 6; I_2. seed × 6. A, Durrington 343; B, Brass 18448; C_1–C_4, Vandenberg & Mann NGF 42285, C_5–C_6, Turner BRI 346261; D, living material; E, Stanley 80214; F, Pullen 8852; G, Sharpe 3651; H, Clarkson 5068; I, Cowie 309.

Specimens examined: Northern Territory. Berrimah, 12°27′S, 130°55′E, Darwin, Mar 1977, *Dunlop* 4168 (DNA); Corndori Billabong, 12°31′S, 132°52′E, Jabiru, Apr 1986, *Cowrie* 309 (BRI).

Distribution and habitat: Widespread in northern and eastern South America and extending to tropical America. Introduced into Australia (in 1965) from Brazil and now naturalised in the Northern Territory (**Map 8**).

S. viscosa can be distinguished by the viscid, densely glandular hairy stems and leaf axes, and by the fruits with 1 or 2 fertile articles and short, strongly uncinate beaks (to 1 mm long). It resembles *S. scabra* but in the latter species the lateral nerves are very conspicuous and raised, the stems are very sparsely glandular hairy, and the fruits have 2 fertile articles, and have longer beaks (to 2.5 mm long).

2. Stylosanthes guianensis (Aublet) Swartz, Svenska Vet. Akad. Handl. 10: 301 (1789); *Trifolium guianensis* Aublet, Pl. Guiana 2: 776, t. 309 (1775). **Type**: French Guiana, Macouria, *Aublet* s.n. (B.M. *n.v.*).
Mohl., Rhodora 65 (763): 249; 254, f. 19 (1963); t'Mannetje, Aust. J. Bot. 25: 347–362; f. 1, 2, 7, 8, 9 (1977).

S. gracilis Kunth, Nov. Gen. et Sp. Pl. 6: 396–397, t. 596 (1823). **Type:** Venezuela, Crescit in monte Turimiquiri, prope El Cocollar, alt 700 hex. (Provincia Novae Andalusiae), *A. Humboldt & A. Bonpland* (*n.v.*)

Herbs or subshrubs with usually much branched, erect or semierect stems to 2 m high; usually setose and viscid; stems hairy on one side with a line of dense fine hairs, puberulous elsewhere, usually densely hispid all over with spreading, long, brownish or purple bristles, rarely subglabrous, sometimes with scattered glandular hairs. Free part of petiole and rachis 3–10 mm long, densely long hairy and bristly, or glabrous; leaflets narrowly elliptic or ovate, 13–44 × 3–9 mm, apex acute or subacute, mucronate; base acute or ± obtuse; entire or minutely spinulose toothed; glabrous or lower surfaces with sparse fine hairs and bristles (midribs bristly), and also with tannin deposits; lateral nerves 4–7-paired, dries whitish, basal pair thick, others usually slender, thickening only towards their tips; petiolules to 0.5 mm long, pubescent. Stipules 1–2.2 cm long, usually flushed with red, sheath nearly as long as the long aristate lobes, 11–15-nerved, glabrous or bristly. Inflorescences short, broadly ovoid, loosely arranged, 1–1.5 × 1.2 cm, 2–32-flowered; primary bracts 1-foliolate, 0.8–2.1 cm long, densely fine hairy outside and bristly, (bristles sometimes gland-tipped); pubescent from apex to the middle inside; secondary ones 6 mm long, entire or dentate; bracteoles 1, narrowly ovate, 4.5–6 × 0.5–1 mm, ciliate. Axis rudiment absent. Calyx tube 2–6 mm long, lobes 2.5–3.5 × 1–1.5 mm. Petals cream to orange-yellow with red or dark streaks; standard 4.5–6 × 3.5–4 mm; wings 2.5–4 × 3–4 mm; keel 2.5–4 × 2–3 mm. Stamens 3–4 mm long. Fertile articles 1, ± ovoid with a very minute beak, 2.5–3 × 1–2.5 mm, obscurely reticulate veined, glabrous or with few hairs at apex; beak strongly bent, 0.1–0.5 mm long; seeds pale brown. **Fig. 2G.**

Selected specimens: Western Australia. Port Hedland area, in 1953, *Runiuh* (PERTH). **Northern Territory**. Near Mudginbarry–Oenpelli Rd, May 1986, *Cowie* 311 (DNA); Port Keats Mission Stn, Sep 1972, *Robinson* (DNA); Tortilla Flats, Jul 1973, *Parker* 123 (DNA). **Queensland**. COOK DISTRICT: Innisfail, Jul 1957, *Dodd* (BRI). NORTH KENNEDY DISTRICT: Mission Beach, Jul 1966, *Hyland* 3899 (BRI). SOUTH KENNEDY DISTRICT: Wollombi, Mackay, Jun 1960, *Chiconi* (BRI). PORT CURTIS DISTRICT: Between Stockyard Point and Five Rocks, about 15.5 km ENE of Byfield, Jul 1977, *Clarkson* 1008 & *Stanley* (BRI). MORETON DISTRICT: 2 km N of Coolum Beach, Sep 1975, *Sharpe* 1303 (BRI).

Distribution and habitat: Native of South America, widespread in northern and central South America. It is the most widely distributed species of the genus; it had been introduced as a pasture legume and cover crop and subsequently become naturalised in most tropical countries, *viz* tropical America, Africa, New Guinea and Australia (**Map 9**); usually along roadsides and other disturbed areas. Several strains have been introduced into Australia from South America (between 1931–75).

S. guianensis is distinguishable by the coarsely hairy stems with brown or purple hispid hairs; broad inflorescences with greenish or purple bracts, and fruits with 1 fertile article and very minute, bent beaks.

Common name: Common stylo.

Uses: As a pasture legume and as a cover crop.

Note: The species varies considerably in the density of indumentum and in the attributes of their leaves. Six varieties were recognised by t'Mannetje (1977), the naturalised plants in Australia are referable to the typical variety.

3. Stylosanthes humilis Kunth, Nov. Gen. et Sp. 6: 506, t. 594 (1823). **Type:** Venezuela, Crescit ad Orinocum (Orinoco), prope Carichanam, locis calidissimis, *A. Humboldt & A. Bonpland* (*n.v.*).

Mohl., Rhodora 65 (763): 245–258, f. 11 & 30 (1963); Nooteboom, Reinwardtia 5(4): 447–450 (1961); Pedley, Austrobaileya 1(1): 37–38 (1977); Verdc., Man. New Guinea Legumes 373; 374, f. 87 (1979).

S. sundaica Taubert, Verh. Brand. 32: 21 (1890). **Type:** Sunda Island, collector unknown (*n.v.*).

[*S. mucronata* auct. non Willd.: Bailey, Qd Agr. J. 31: 115–116, t. 99 (1913); C. White, Proc. R. Soc. Qd 34: 34 (1923)]

Herbs or subshrubs, with tufted, branched, decumbent stems to 60 cm; usually densely hairy on one side of the stem with dense soft fine hairs; the other side puberulent or glabrous; bristles usually scattered all over the stem (dense below nodes). Free part of petiole and rachis (2–)5–11 mm long, finely hairy and bristly; leaflets narrowly elliptic or ovate, (7–)10–38 × 2–4(–6) mm, apex acute or acuminate; base acute or subobtuse; glabrous above, finely hairy or sparsely bristly on lower surfaces and margins, usually papillose below; lateral nerves 2- or 3- (or 4)-paired, oblique, ± feeble, sometimes thickening towards apex; petiolules to 0.5 mm long, hairy or glabrous. Stipules scarious with green tips, (3–)6–11 mm long, sheath usually as long as the aristate lobes, 5–7-nerved, finely hairy and bristly. Inflorescence short, ovoid or capituliform, 4–15 × 6–10 mm, 3–11-flowered; primary bracts 1–3-foliolate, 5–15 mm long, finely hairy and bristly outside; secondary ones 4–4.5 × 1.5–3 mm, entire or toothed; bracteoles 1 or 2, narrowly ovate, acuminate, 3–4.5 × 0.5–1 mm, densely ciliate. Axis rudiment rarely present, then deciduous. Calyx tube 2–5 mm long, lobes 1.5 × 0.5–1 mm. Petals yellow or orange; standard 3–4.5 × 2–3 mm; wings 4 × 2 mm; keel 2–3.5 × 2 mm. Stamens 3–4 mm long. Fertile articles 1, rarely 2, upper articles long beaked, 2.5–3.5 × 1.5–2.5 mm, ridged above, keeled and prominently reticulate veined; sparsely appressed hairy; beak protruding from the inflorescence, 3.5–7 mm long, strongly curved, uncinate at apex, sparsely hairy; seeds ovoid, 2.5 × 1.5 mm. **Fig. 2F.**

Selected specimens: Western Australia. Derby, May 1962, *Royce* 6881 (PERTH); Great Northern Highway, 200 km N of Halls Creek, Apr 1985, *Aplin et al* 392 (PERTH). **Northern Territory.** Victoria Settlement, Cobourg Peninsula, May 1963, *Letts* (DNA); Gove Peninsula, Apr 1974, *Hinz* B7494R (DNA); On Munmarlary track S of junction with Arnhem Highway, 11 km N of Nourlangie Ranger Stn, Jun 1980, *Craven* 6523 (CANB); Mullapunyah Spring Stn., 51 km from Barkly Tableland Highway, May 1984, *Halford* 84523 (DNA). **Queensland.** Cook District: Vallack Point, 1.5 miles [2.4 km] S of Somerset, May 1948, *Brass* 18802 (BRI, CANB). Burke District: Mornington Island, May 1963, *Tindale* (AD). North Kennedy District: Castle Hill, Townsville, Jun 1931, *Blake* 5969 (BRI). Port Curtis District: Couti-Outi, 70 miles (112 km) NNW of Rockhampton, Jun 1960, *Johnson* 2007 (BRI). Warrego District: 45 miles (72 km) S of Charleville on Warrego River, Apr 1962, *Ebersohn* E328 (BRI). Moreton District: D.P.I. Complex, Indooroopilly, May 1981, *Dilleward & Stanley* 554 (BRI).

Distribution and habitat: Native of South America; widespread in Central South America and tropical America. Naturalised in most tropical countries including Malaysia, Indonesia, New Guinea and Australia. It was introduced into northern Australia (about 1900) probably from Brazil and now widely naturalised in Queensland and parts of Northern Territory and Western Australia (**Map 10**); usually along roads and other disturbed areas. The species is common around Townsville.

S. humilis is easily distinguished by the long beaks of fruits which protrude from the inflorescences; by the bristly bracts and stems, and also by the lines of dense fine hairs on one side of the stem. Some forms of this can be confused with *S. hamata*, but may be separated by the non bristly stems and bracts, and by the very conspicuous lateral nerves which are also greater in number (up to 7-paired) of the latter species.

Common name: Stylo, Townsville stylo or Townsville lucerne.

Uses: Regarded as a very useful fodder legume in Australia.

Note: *S. humilis* varies considerably in hairiness, in the shape and size of leaflets and articles, in the number of bracteoles, and in the absence or presence of an axis rudiment. The majority of the Australian specimens have only 1 bracteole and no axis rudiment, but a few plants however are provided with a second bracteole and a small deciduous axis rudiment (very rarely); these are probably the same as Malesian ones previously called *S. sundaica* Taubert (Pedley 1977).

4. Stylosanthes hamata (L.) Taubert, Verh. Bot. Brand. 32: 22 (1890); *Hedysarum hamatum* L., Syst. Nat. 10: 1170 (1759). **Type:** Jamaica, Sloan Herb. t. 119, f. 2. Mohl., Rhodora 65 (763): 248; 254, f. 16 (1963).

S. procumbens Swartz, Prod. Veg. Ind. Occ.: 108 (1788) *nom. illeg.* **Type:** Jamaica *loc. cit.*

Herbs with usually much branched, erect (rarely ± procumbent) stems to 70 cm high; stems usually densely hairy on one side with a line of fine pilose hairs, the rest of the stem glabrous. Free part of petiole and rachis (2–)4–7 mm long, channelled above, pilose at margins; leaflets elliptic, narrowly ovate to elliptic-ovate, (10–)13–29 × 2–5 mm, apex acute or acuminate; base acute; both surfaces glabrous, or lower ones finely sparsely hairy, ciliate; lateral nerves thick, prominently raised below, (4–)5–7-paired, oblique, ascending and arched at their tips, dries whitish; petiolules to 0.5 mm long, pilose. Stipules (8–)11–16 mm long, sheath nearly as long as the long aristate lobes, 5–9 mm long, 5–9-nerved, glabrous or with fine appressed hairs outside, ciliate. Inflorescences small, narrow, oblong or ovoid, 1.2–1.5 × 1.2–1.5 cm, 4–11-flowered; primary bracts unifoliolate, (0.7–)1–2 cm, sheath 5–7-nerved, usually sparsely villous with white hairs on both surfaces, ciliate; secondary ones 3-dentate, 4 × 1.5 mm; bracteoles 2, narrowly ovate, attenuate, acuminate, ciliate, 3–4 × 1–1.5 mm. Axis rudiment present (usually in the lower flowers), 4–6 mm long, densely villous. Calyx tube 3–6 × 1 mm, lobes 2 × 0.8–1 mm. Petals yellow; standard 4–5 × 3–3.5 mm; wings 4.5 × 3.5 mm; keel 3–4 × 2 mm. Stamens 4–5 mm long. Fruits 2-articulate, the lower one densely villous; upper one long-beaked, ovoid, 3–4.5 × 1.5–2 mm, prominently reticulate-veined, glabrous or with sparse hairs along the ridge only; beak 3–5.5 mm long, curved, uncinate at apex; seeds dark brown, 2–2.5 × 1–1.5 mm. **Fig. 2E.**

Specimens examined: Western Australia. Derby to Broome Rd, 19.6 km S of Derby, Apr 1985, *Aplin et al* 56 (PERTH); S of Hunter Ck, E of Cape Leveque, Dampierland Peninsula, Aug 1985, *Kenneally* 9468 (PERTH). **Northern Territory**. IB Bore, Benmarra Stn, May 1984, *Strong* 109 (DNA); Soudan Stn, 9 km W of H.S., May 1977, *Henshall* 1796 (CANB,DNA); Arnhem H/W, S. Alligator, Oct 1984, *Cowie* 192 (CANB); about 17 km from ENE of Soudan H.S., Aug 1978, *Donner* 6139 (AD). **Queensland**. COOK DISTRICT: 17 km along main Weipa Rd off Peninsula Rd, Apr 1988, *Forster* 4046 & *Liddle* (BRI). NORTH KENNEDY DISTRICT: NW of Townsville, Feb 1980, *Stanley* 80219 (BRI). BURKE DISTRICT: 13 miles [20.8] km from Cloncurry towards Kynuna along Landsborough H/W, Jul 1979, *Carriage* 16 (BRI).

Distribution and habitat: Native of South America; widespread in the Caribbean Islands, and tropical America. Introduced into Australia (between 1961 and 1975) from South America (Venezuela), naturalised in northern Australia and central Queensland (**Map 11**); along riverbanks, in swampy areas and disturbed areas.

S. hamata is distinguishable by the white hairy, non bristly stems and bracts, lines of long fine hairs on one side of stem, and by the presence of a ± villous axis rudiment. It can be confused with *S. humilis* which has similar leaves, but bracts and stems are bristly, and lateral nerves fewer (only 2 or 3 (–4) pairs), ± feeble in the latter species.

Common name: Caribbean stylo.

5. Stylosanthes scabra J. Vogel, Linnaea 12: 69 (1838). **Type:** Brazil in Serra da Moeda, *F. Sello* as "*Sellow*", & *B. Luschnath* ad Baia (syn. *n.v.*).
Mohl., Rhodora 65(763): 247; 251, f. 6 (1963).

Subshrubs with erect, much branched stems to 1 m high; usually viscid and hairy; densely hairy on stems and leaf axes with fine long hairs and bristles, sometimes sparsely glandular hairy, rarely ± glabrous. Free part of rachis and petiole 6–9(–15) mm long. Leaflets elliptic, 10–22(–28) × 3.5–7(–9) mm, apex subacute or obtuse, mucronate; base subacute or subtruncate; finely pilose above, lower surfaces and margins densely or sparsely hairy with soft long hairs and scattered short bristles and glandular hairs, usually

with a reticulate pattern of tannin below; lateral nerves 4–6-paired, oblique and ascending, thick and very conspicuous, dries whitish; petiolules to 0.5 mm long. Stipules (9–)12–14 mm long, sheath nearly twice the length of the aristate lobes, 7–9-nerved, sparsely finely hairy and bristly. Inflorescences short, oblong, 10–18 × 8–12 mm, 7–9-flowered; primary bracts unifoliolate, 11–12.5 mm long, sheath longer than teeth, 5–7-nerved, densely hairy and ciliate; secondary ones ovate, 3-dentate, 2–3 × 1.5–2 mm, ciliate; bracteoles 2, narrowly ovate, acute, 2.5–3 × 0.5 mm, ciliate. Axis rudiment 5 mm long, rusty villous. Calyx tube (3–)4–6 mm long, lobes 2 mm long. Petals yellow with red markings; standard 4–6 × 3.5–6 mm; wings 4–5 × 3–4 mm; keel 3.5 × 3 mm. Stamens 3.5–4 mm long. Fertile articles 2; upper article 5–6.5 mm long (including short beak), 2–2.5 mm diameter, obscurely reticulate veined, sparsely hairy except densely appressed hairy ridge; lower article 3 × 2 mm, densely appressed hairy; beak 1.5–2.5 mm long, slightly curved, uncinate at apex, usually densely long hairy; seeds 2 × 1 mm, brown. **Fig. 2H.**

Specimens examined: Western Australia. Kimberleys, Gibb River–Kalumburu Mission Rd, 2 km S of Drysdale River crossing, ± 182 km WSW of Wyndham, May 1976, *Beauglehole* 51700 (PERTH). **Northern Territory.** Tortilla Flats, Jul 1973, *Parker* 122 (DNA); Bullita Stn airstrip, Feb 1986, *Clarke* 345 and *Wightman* (DNA). **Queensland.** Cook District: Weipa, top of A and B Slurry Dam, May 1981, *Morton* 1291 (BRI); Road to Bolt Head off Maloney Springs to Carron Valley Rd, Jun 1989, *Forster* 5489 (BRI); Bamboo Range, 19 km past Musgrave on Coen Rd, Jun 1989, *Forster* 5230 (BRI); Source of Shanty Ck, 1 km SW of Stones Hill, Jul 1989, *Forster* 5603 (BRI).

Distribution and habitat: Native of South America where it is widespread. Introduced into Australia (in 1965) from Brazil, and now naturalised in northern Australia (**Map 12**); along roadsides and other disturbed areas, in open forests.

S. scabra is distinguishable by the elliptic, obtuse or subacute leaflets; thick, very conspicuous lateral nerves; densely hairy stems with long fine ordinary hairs, scattered bristles and glandular hairs, and also by the fruits with 2 fertile articles and a long hairy beak to 2.5 mm long. This species can sometimes be confused with *S. guianensis* (Aublet) Swartz, and *S. viscosa* Swartz, but the former differs in having lines of fine hairs on one side of stem and fruits with 1 fertile article and a minute beak, while the latter differs in the densely glandular hairy stems, petioles and rachis, and fruits with 1 fertile article and a short strongly uncinate beak.

Subtribe 4. POIRETIINAE

Subtribe **Poiretiinae** (Burkart) Rudd in Polhill & Raven, Adv. Legume Syst. 1: 353 (1981).

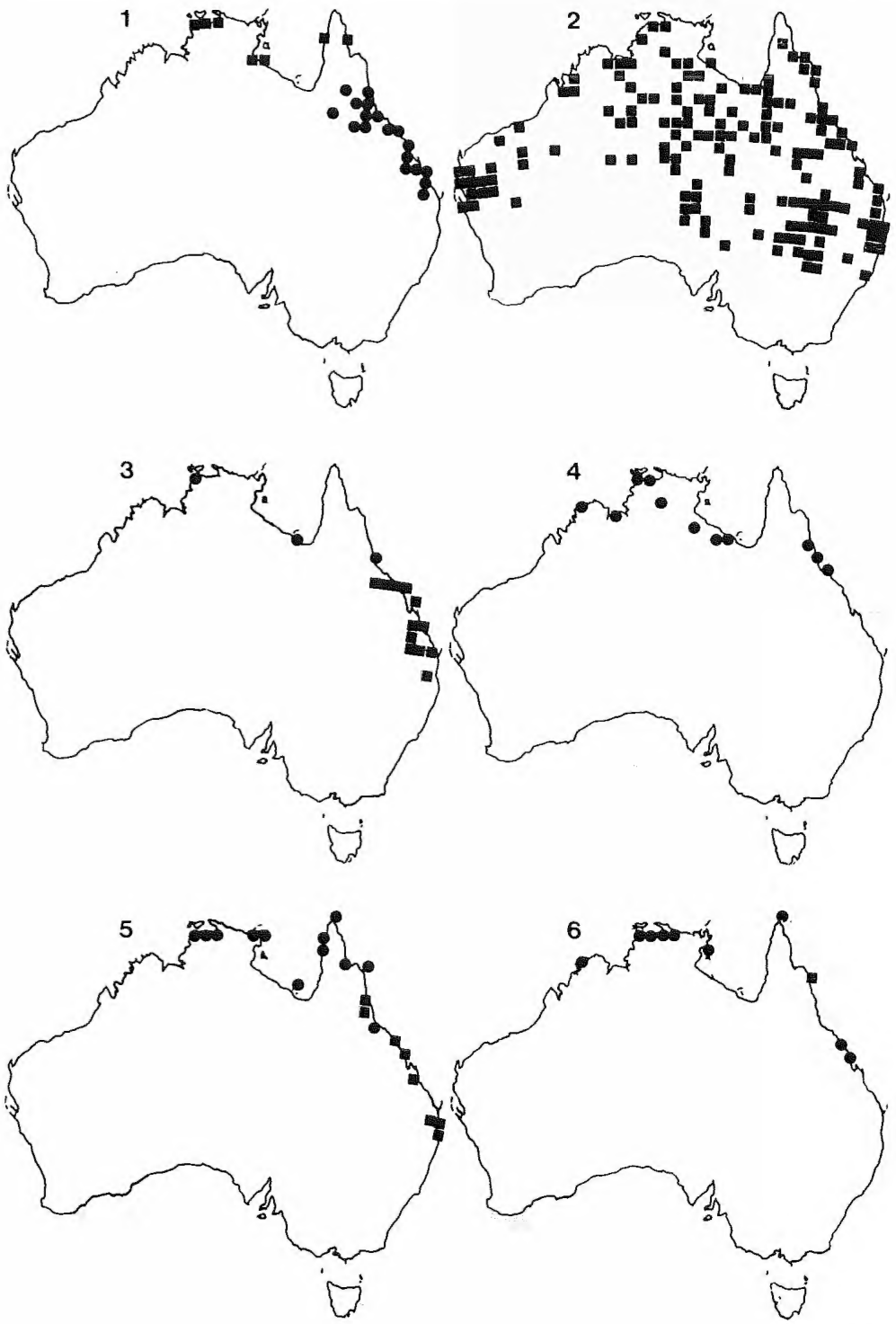
Hedysareae subtribe Poiretiinae Burkart, Darwiniana 3: 124 (1939) as "Poiretinae".

Leaves usually with pellucid or pustular glands, leaflets digitately (1 or) 2 or 4, or numerous and imparipinnate. Flowers sessile or pedicellate, pedicels usually without joints or bracteoles. Calyx tube short. Anthers dimorphic. Fruits with 1 to several, quadrate, subsimilar, reticulately veined articles, often ornamented with crests, bristles or glands.

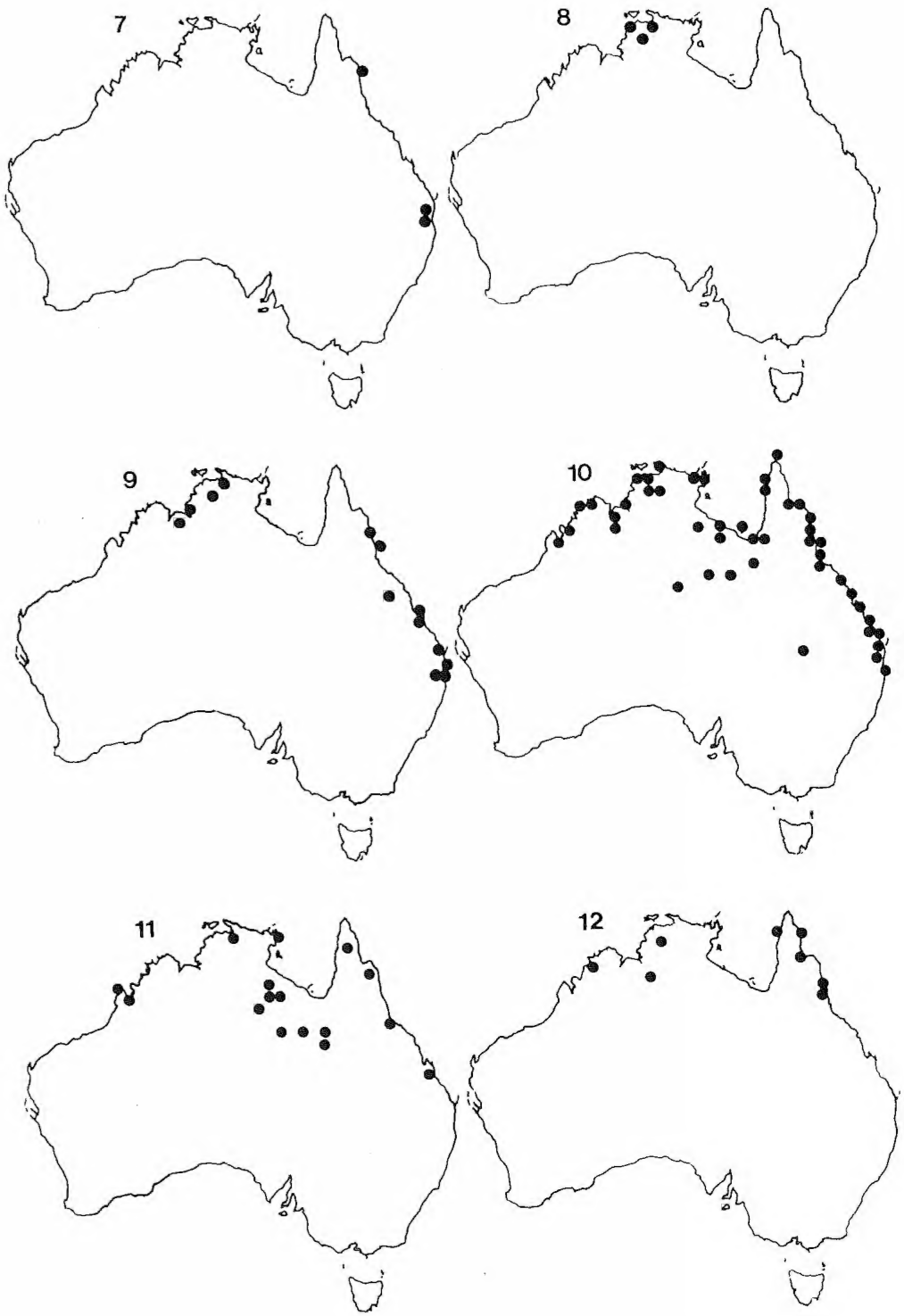
Four genera, only *Zornia* (Reynolds & Holland 1989) occurs in Australia.

Acknowledgements

I am grateful to the Australian Biological Resource Study, Federal Department of the Arts, Sports, The Environment, Tourism and Territories for a grant in 1987 to undertake Research on the tribe Aeschynomeneae in Australia. I would like to thank Mr Les Pedley for his constructive comments on the manuscript, Dr Bob Johnson for his support and Mr Rod Henderson for his helpful suggestions and useful advice, Mr David Halford for his assistance with measurements and maps, and Mr Will Smith for the illustrations and maps. My thanks are also extended to Dr J. Ross, Miss H. Aston and Dr B. Briggs for allowing me full access to specimens in their institutions, Dr P. Morat and Mr J. Bosser of Museum National d' Histoire naturelle Paris for checking the types of *Aeschynomene brevifolia* and *A. micranthos*, and the Directors of the following herbaria for the loan of herbarium material, types and photographs – AD, CANB, DNA, FI, G, L, MEL, NSW, PERTH and PR.



Maps 1–6. 1–4. *Aeschynomene* spp.: 1. ■ *A. aspera*, ● *A. micrantha*. 2. *A. indica*. 3. ■ *A. brevifolia*, ● *A. americana*. 4. *A. villosa*. 5. *Smithia* spp.: ● *S. conferta*, ■ *S. sensitiva*. 6. ● *Cyclocarpa stellaris*, ■ *Ormocarpum orientale*.



Maps 7–12. 7. *Arachis hypogea.* 8–12. *Stylosanthes* spp.: 8. *S. viscosa.* 9. *S. guianensis.* 10. *S. humilis.* 11. *S. hamata.* 12. *S. scabra.*

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Accepted for publication 21 February 1990

Austrobaileya 3(2): 203–214 (1990)

SIX NEW SPECIES OF *HEDYOTIS* L. (RUBIACEAE) FROM NORTHERN AUSTRALIA

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Summary

***Hedyotis argillacea*, *H. largiflorens*, *H. leptocaulis*, *H. laceyi* *H. thysanota* and *H. delicata* are described as new, and their distribution and relationship to allied species occurring in Australia are discussed.**

Introduction

In the course of investigations into the delimitation of the two closely related genera *Hedyotis* L. and *Oldenlandia* L. in Australia, it has become apparent that there are a number of undescribed taxa in them. This is a preliminary paper to formalise names for six taxa to be used in my forthcoming revision of the genera in Australia. The taxa have been described under *Hedyotis* L. which is the correct name for these genera when combined (Merrill & Metcalf 1942).

Herbarium material from BRI, CANB, DNA, MEL, NSW, NT and PERTH has been examined. All measurements have been taken from dried and spirit material except for *H. leptocaulis* where dried and reconstituted material was used. Floral and fruit measurements were made using a Wild binocular microscope fitted with a Wild MMS 235 Digital Length Measuring Unit. Note: NT specimens are now incorporated in DNA.

Hedyotis argillacea Halford, **sp. nov.** affinis *H. coerulescentis* F. Muell. sed capsulis ellipsoido-obconicis rostro obtuso-retuso praeditis et seminibus depresso-ellipsoideis diagnoscenda. *H. coerulescens* capsulis oblongo-ellipsoideis rostro retuso-truncato et seminibus dorsiventraliter complanatis praeditur. **Typus:** Northern Territory. DARWIN AND GULF DISTRICT: 6 km NE of Cape Crawford Roadhouse towards Borroloola, 16°38′S, 135°46′E, 30 April 1989, *D. Halford* H93 (holo: BRI; iso: DNA,K,PERTH).

Slender erect, ascending or diffuse annual herb up to 40 cm tall, branches often sprawling at maturity. Stems terete or obtusely 4-angled, glabrous or with short erect hairs, usually scabridulous on ribs. Leaves opposite; basal leaves subsessile, elliptic to ovate, 5–10 mm long, 3–5 mm wide, often disappearing before plant matures; cauline leaves sessile, linear to narrowly obovate, 1.5–5 cm long, 1–2.5 mm wide, attenuate at apex and base, glabrous or with minute scabrous hairs above and on midrib below, glabrous below, with midrib prominent below. Stipules fused and adnate to the leaf bases; stipule-sheath 0.5–1 mm long, glabrous, produced into triangular lobe, margin sometimes fimbriate. Inflorescences lax, terminal monochasial or dichasial cymes with leaf-like bracts decreasing in size towards apex. Flowers in pairs at nodes sometimes solitary. Pedicels terete, 5–20 mm long. Calyx lobes 4, triangular, 0.5–1.0 mm long, slightly keeled, connate at the base, with margin serrulate or entire; sinus between lobes rounded or acute. Corolla pale mauve outside, with lobes white on adaxial surface becoming pale pink with age; tube short, 0.5–1 mm long; lobes 4, linear, 2.5–3.5 mm long, apex acute, geniculate at c. 1/4 of their length from the tube, with a line of hairs on lobes at knee. Filaments c. 0.3 mm long, attached in corolla tube at or just below sinus between lobes; anthers oblong, 0.4–0.7 mm long. Ovary obconical, 2-locular, 1–2 mm long, glabrous. Style c. 0.5 mm long; stigma bifid; lobes c. 0.5 mm long, erect, subulate. Stamens and style exerted from corolla tube but enclosed by lobes, overtopped by ring of hairs. Placenta fleshy, oblong, attached below centre of septum by stout stalk; ovules 30–50/locule. Capsule crustaceous, ellipsoid-obconical, 2.5–5 mm long (including beak), 1.7–3 mm wide, always longer than wide, glabrous or with minute scabrous hairs, laterally compressed, furrowed along dissepiment; beak short, obtuse-retuse, 0.8–1 mm long, splitting loculicidally, secondary splitting septicidally, beak enclosed by persistent calyx lobes. Seeds numerous, depressed ellipsoid-ovoid, c. 0.7 mm wide; testa brown, reticulate. **Figs 1 & 4A.**

Selected specimens: Western Australia. GARDNER DISTRICT: Cotton fields, Kununurra, May 1967, *Scrymgeour* 1710 (PERTH); 1 km E of grid, 15 km S junction of old road & Victoria Hwy, Jul 1978, *Andrew* 144 (DNA). **Northern Territory.** DARWIN AND GULF DISTRICT: 6 km NE of Cape Crawford Roadhouse towards Borroloola, Apr 1989, 16°38′S, 135°46′E, *Halford* H93 (BRI). VICTORIA RIVER DISTRICT: 37 km E of W.A./N.T. border along Victoria Hwy, Newry Station, 16°03′S, 129°17′E, Apr 1989, *Halford* H59 (BRI); 40 km W of Suplejack [Supplejack] Homestead, 19°18′S, 129°36′E, Sep 1978, *Latz* 8129A (NT); Timber Creek, 15°37′S, 130°27′E, Jul 1977, *Parker* 1077 (BRI,NT). BARKLY TABLELAND DISTRICT: 28 km N Connell's Bore, 18°43′S, 136°27′E, Jun 1982, *Latz* 9571 (NT); 3 km W of IB Bore, Benmara Station, 17°55′S, 136°52′E, May 1984, *Strong* 139 (NT). **Queensland.** BURKE DISTRICT: 13 km W of Gregory Downs Homestead towards Lawn Hill, 18°38′S, 139°07′E, May 1989, *Halford* H100 (BRI). NORTH KENNEDY DISTRICT: 126 km towards Lynd Junction from Mt Garnet along Kennedy Development road, 18°41′S, 144°44′E, May 1989, *Halford* H126 (BRI); Low Holm, NW of Pentland, 20°06′S, 145°59′E, Jul 1954, *Blake* 19365 (BRI). (14 specimens examined).

Distribution and habitat: Recorded across northern Australia from Kununurra, Western Australia, to Mt Garnet, Queensland **(Map 1)**. It is found on clay soils, rarely on sandy soils, in grasslands, herblands and open woodlands, also around moist depressions on road verges and irrigated fields. Has once been collected on a rocky platform in a watercourse.

Relationships: It is closely related to and resembles *H. coerulescens* F. Muell., from which it may be distinguished by its ellipsoid-obconical capsules with obtuse-retuse beak and depressed ellipsoid-ovoid seeds **(Fig. 4A)**. In *H. coerulescens* the capsules are obloid-ellipsoid with retuse-truncate beaks and dorsiventrally flattened seeds with a hilar ridge **(Fig. 4B)**.

Conservation status: *H. argillacea* is widely distributed but is not known to occur in any conservation reserves. Although its habitat is used for grazing of domestic stock it is not presently considered endangered or threatened.

Notes: *H. argillacea* resembles the Indian *H. graminifolia* L.f. in capsule shape and habit. Further studies may reveal it to be better considered as an infraspecific taxon.

Etymology: The specific epithet refers to the clay soils in which this species commonly grows.

Hedyotis largiflorens Halford, **sp. nov.** maxime similis *H. laceyi* et *H. leptocauli* sed ab amobus statura elatiore et floribus majoribus, corollis eis hujus usque duplo longioribus; a speciebus ceteris Australianis capsulis globosis calycis lobis persistentibus erectis ad apicem ornatis differt. **Typus:** Northern Territory. DARWIN AND GULF DISTRICT: Edith Falls, 33 km N of Katherine, 14°06′S, 132°12′E, 28 April 1989, *D. Halford* H75 (holo: BRI; iso: DNA,K,PERTH).

Annual erect or ascending herb up to 50 cm tall. Branches pubescent with short erect hairs or glabrous; internodes up to 9 cm long. Leaves opposite; basal leaves not seen; cauline leaves sessile, linear, 3–6 cm long, c. 1 mm wide, attenuate at base, acuminate at apex, sparsely scabridulous above and on midrib below, glabrous below, with margin recurved, with midrib prominent below. Stipules fused and adnate to the leaf bases; stipule-sheath 0.5–1 mm long, tuberculate, produced into lobe, colleters on margin shortly fimbriate. Inflorescences lax, terminal cymes with leaf-like bracts decreasing in size towards apex. Pedicels slender, erect, 10–60 mm long. Calyx lobes 4, triangular, 0.5–1.5 mm long, scabridulous, connate at base, acuminate to acute at apex, margin serrulate; sinus between lobes acute, colleters sometimes present between lobes. Corolla white with mauve stripes running the length of lobes, narrowly infundibular, short erect hairs outside; tube 6–8.5 mm long, glabrous or sparsely hairy inside; lobes 4, ovate, 3–6.5 mm long, pilose towards base inside. Stamens exserted; filaments terete, 0.5–1 mm long; anthers 2–2.3 mm long. Ovary globose, 2-locular, 1–1.5 mm diameter, scabridulous. Style exserted from tube when mature, 6.5–7.5 mm long; stigma bifid; lobes filiform, 2.5–3 mm long, twisted, hairy. Placenta fleshy, peltately attached to septum; ovules 35–50/locule. Capsule crustaceous, globose, 2–3 mm diameter, papillose, persistent calyx lobes erect, on top of capsule; beak slightly raised, rounded. Mature seeds not seen. **Fig. 1.**

Additional specimens examined: Western Australia. GARDNER DISTRICT: Lone Dingo, Mitchell Plateau, 14°35′S, 125°45′E, Jun 1987, *Keighery* 8990 (PERTH); c. 8 km SE of Mitchell River Homestead, 15°10′S, 125°50′E, Jun 1985, *Fryxell* 4745 *et al.* (CANB); Dog leg Swamp, Mitchell Plateau, 14°56′S, 126°00′E, May 1978, *Kenneally* 6718 (DNA). **Northern Territory.** VICTORIA RIVER DISTRICT: Mount Thymaman, 15°11′S, 130°50′E, Mar 1989, *Leach* 2379 & *Dunlop* (BRI).

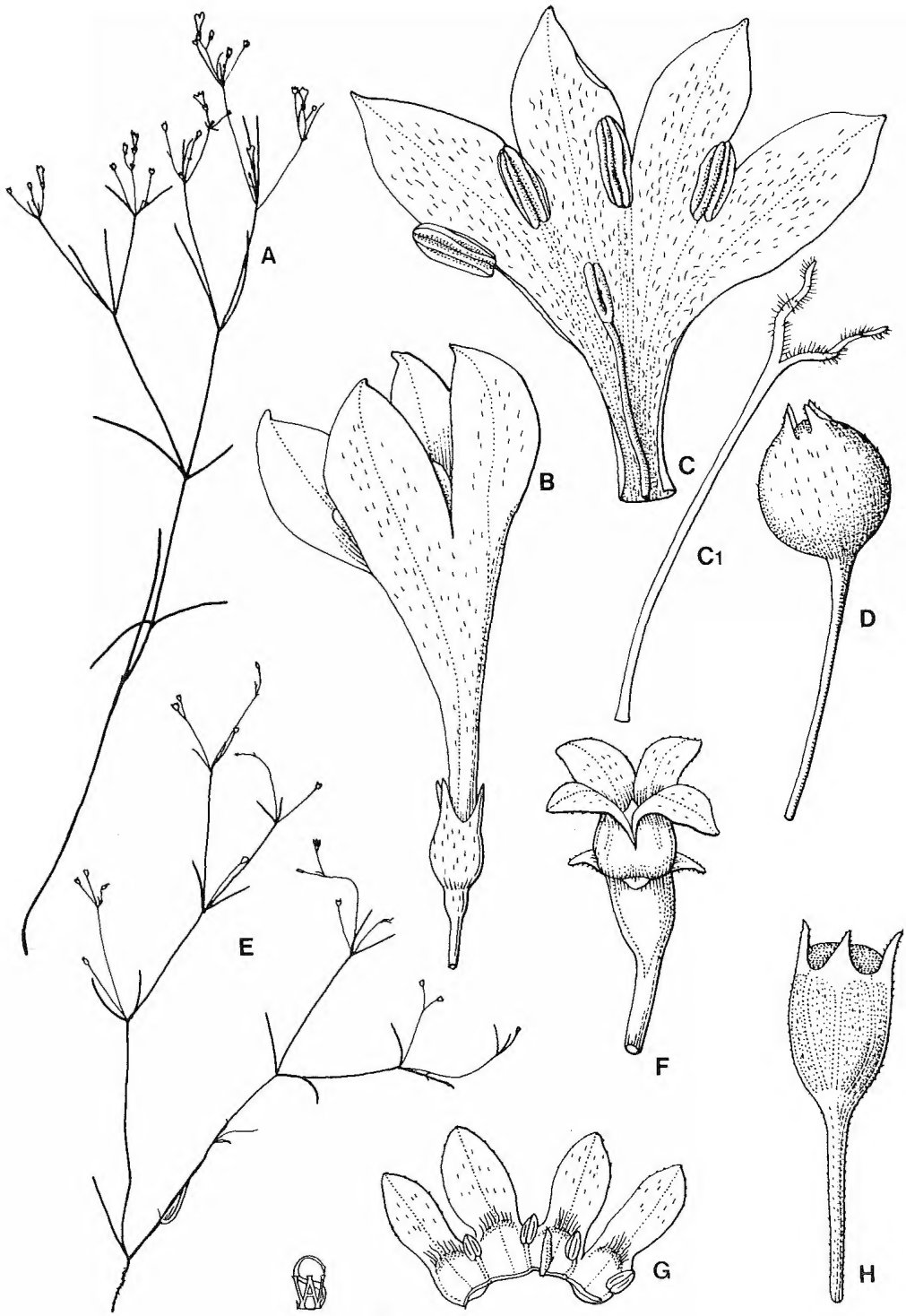

Fig. 1. *Hedyotis largiflorens*: A. habit × 0.3. B. flower × 6. C. corolla opened out, and immature style × 6. C_1. mature style × 6. D. Capsule × 6. *H. argillacea*: E. habit × 0.3. F. flower × 6. G. corolla opened out, and style × 6. H. capsule × 6. A, Keighery 8990; B–D, Halford H75; E, Halford H59; F–H, Halford H126.

Distribution and habitat: *H. largiflorens* is presently known from five populations in the area from the Mitchell Plateau, Western Australia to near Katherine in the Northern Territory **(Map 1)**. Occurs on lateritic loam or sandy soils in *Eucalyptus* woodlands.

Relationships: *H. largiflorens* is most closely allied to *H. laceyi* and *H. leptocaulis* but is readily distinguished from these species by its taller stature and larger flowers; corolla tube 6–8.5 mm long as compared to 1.5–4.5 mm and 4–5.5 mm long respectively. *H. largiflorens* differs from other Australian species of *Hedyotis* in its globose capsule and peltate placenta as well as its larger flowers.

Conservation status: Although fairly widely distributed, this species is only known from five populations. The holotype locality is in Nitmiluk National Park, formerly known as Katherine Gorge National Park. A conservation coding of 3K is appropriate based on criteria of Briggs and Leigh (1988).

Etymology: The specific epithet was chosen to draw attention to the flower size in the species, being the largest flowers of all known Australian species.

Hedyotis leptocaulis Halford, **sp. nov.** accedit *H. laceyi* et *H. largiflorentem*, proxime *H. laceyi*, sed corollis infundibuliformibus, filamentis staminalibus longioribus et calycis lobis longioribus differt; a *H. largiflorenti* statura breviore et floribus parvioribus distinguitur; a speciebus ceteris Australianis (praeter *H. laceyi*) capsulis globosis, placenta peltata et caulibus tenuibus differt. **Typus:** Northern Territory. DARWIN AND GULF DISTRICT: 7.5 km S of Cooinda on Pine Creek road, 12°58′S, 132°31′E, 20 May 1980, *M. Lazarides* 8869 (holo: DNA; iso: AD,BRI,CANB, MEL,NSW).

Erect, ascending or diffuse, annual herb. Stems terete, slender, glabrous or pubescent near nodes with short erect hairs. Leaves opposite; basal leaves sessile, linear, 5–8 mm long, c. 0.5 mm wide; cauline leaves sessile, linear, 1.5–2.5(–3.5) cm long, 0.5–1 mm wide, attenuate at apex, glabrous or sparsely covered with short erect hairs above. Stipules fused and adnate to the leaf bases; stipule-sheath c. 0.5 mm long, sparsely covered with erect hairs, produced into lobe c. 0.7 mm long, margin entire or fimbriate. Inflorescences lax, terminal dichasial cymes with leaf-like bracts decreasing in size towards apex. Pedicels capillary, 5–20(–35) mm long. Calyx lobes 4, narrow triangular, 0.5–1.5 mm long, connate at base, margin entire or finely serrulate; sinus between lobes acute. Corolla white, pink to mauve, infundibular; tube 4–5.5 mm long, with scattered short erect hairs outside, glabrous or somewhat hairy inside; lobes 4, ovate, 2–3 mm long, sparsely covered with short glandular hairs inside especially towards base. Stamens exserted; filaments terete, 0.5–1 mm long, erect, reflexed with age; anthers oblong, 0.5–0.8 mm long. Ovary globose, 2-locular, 0.5–1 mm diameter, glabrous or with minute scabrous hairs. Style exserted from tube when mature, 3.5–5 mm long; stigma bifid; lobes filiform, 1.5–2 mm long, twisted, hairy. Placenta fleshy, peltately attached to septum. Capsule crustaceous, globose, 1.5–2 mm diameter, glabrous, persistent calyx lobes erect on capsule; beak slightly raised, rounded, splitting loculicidally. Seeds minute, squat-angular, truncate at apex; testa pale brown, finely reticulate. **Fig. 2.**

Selected specimens: Northern Territory. DARWIN AND GULF DISTRICT: 13 miles [21 km] SE of Darwin, 12°29′S, 131°00′E, May 1958, *Chippendale* 4435 (BRI,NSW,NT); Howard Springs area, 16 miles [26 km] SE of Darwin, 12°27′S, 131°04′E, May 1959, *Chippendale* 6160 (NT); 3.3 km E Humpty Doo Hotel, 12°35′S' 131°07′E, May 1976, *Dunlop* 4254 (DNA); Near Black Jungle, 12°32′S, 131°14′E, Jun 1968, *Wheelright* DW53 (DNA); Baroalba Creek, 10 km ESE of Nourlangie Ranger Station on Pine Creek road, 12°46′S, 132°45′E, May 1980, *Craven* 5494 (BRI,DNA,MEL); Nourlangie Creek, 12°50′S, 132°46′E, Jun 1974, *Fox* 493 (DNA); Koongarra – Hickey creek, 12°51′S, 132°50′E, Jun 1978, *Rice* 2685 (BRI,CANB); Mudginberri Station, 3 km N of homestead, 12°33′S, 132°55′E, May 1981, *Henshall* 3632(NT). (18 specimens examined).

Distribution and habitat: Found on the wetlands east of Darwin to the Arnhem Land escarpment, Northern Territory **(Map 2)**. Occurs on moist sands, and peaty soils in grasslands, sedgelands and open *Melaleuca* woodlands in swamps, seasonally flooded flats and creek beds and banks; also on disturbed swampy soil on roadside.

Relationships: *H. leptocaulis* approaches *H. laceyi* and *H. largiflorens*. It is closest to *H. laceyi* from which it differs in having infundibuliform corollas, longer staminal filaments (0.5–1mm long) and longer calyx lobes (0.5–1.5 mm long). It can be distinguished from *H. largiflorens* by its shorter stature and smaller flowers. *H. leptocaulis* differs from other

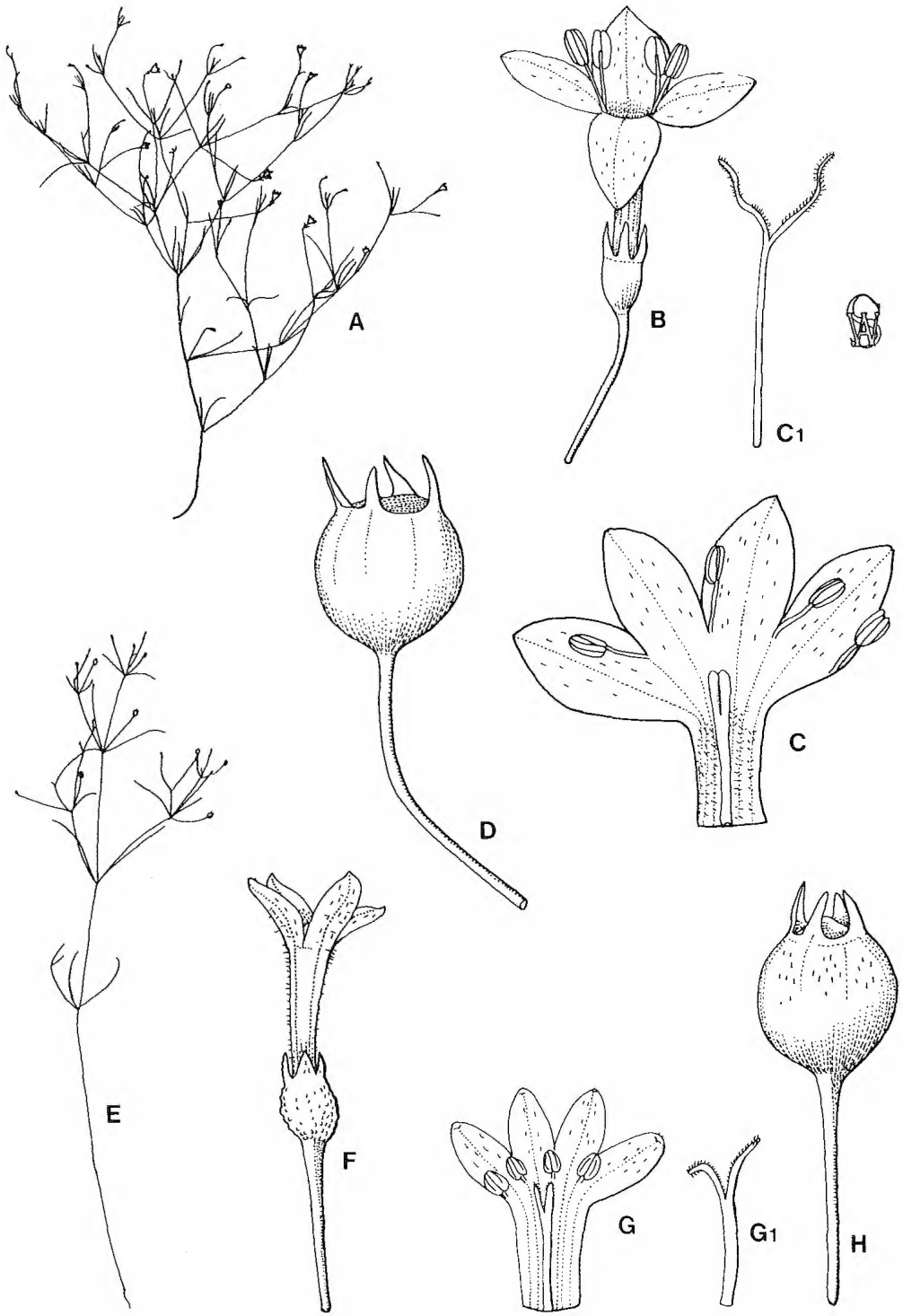

Fig. 2. *Hedyotis leptocaulis*: A. habit × 0.3. B. flower × 8. C. corolla opened out, and immature style × 8. C_1. mature style × 8. D. capsule × 8. *H. laceyi*: E. habit × 0.3. F. flower × 8. G. corolla opened out, and immature style × 8. G_1. mature style × 8. H. capsule × 8. A, Lazarides 8869; B,C,C_1, Craven 5494; D, Dunlop 3613; E,H Halford H120; F, Halford H72; G,G_1, Halford H91.

Australian species of *Hedyotis* by its globose capsule, peltate placenta and its slender stems.

Conservation status: *H. leptocaulis* has a moderately wide distribution and is conserved in Kakadu National Park. However, the majority of known populations are outside conservation reserves and future development of the wetlands east of Darwin may greatly deplete the populations in most of its native range. A conservation coding of 3K is appropriate based on the criteria of Briggs and Leigh (1988).

Etymology: The specific epithet refers to the slender stems of the species.

Notes: The circumscription of *H. leptocaulis* includes the taxon to which Schwarz (1927) applied the name *Oldenlandia tenuissima. Oldenlandia tenuissima* Schwarz (1927) is an illegitimate name as it is a later homonym of *O. tenuissima* Hiern (1877). Hiern's name is based on African material which belongs to a completely different taxon from the one described by Schwarz.

Hedyotis laceyi Halford, **sp. nov.** *H. leptocaulem* praesertim habito, capsulis, inflorescentiis seminibusque simulat sed corollis hypocratiformibus, filamentis staminalibus brevioribus et calyce breviore differt; insuper *H. largiflorentem* simulat sed statura breviore et floribus parvioribus differt; a speciebus ceteris Australianis (praeter *H. leptocaulem*) capsulis globosis, placenta peltata et caulibus tenuibus differt. **Typus:** Queensland. COOK DISTRICT: Mareeba mining lease, Tinaroo Creek road, c. 15 km SE of Mareeba, 9.6 km off Kennedy Highway, 1 km before Oreiglas Creek crossing, 17°05′S, 145°30′E, 1 May 1972, *I.B. Staples* 010572/11 (holo: BRI; iso: DNA,K,PERTH).

Erect or ascending, annual herb to 30 cm high. Stems terete, slender, glabrous or with scattered tubercles especially at nodes and base when young. Leaves opposite; basal leaves petiolate, c. 1 mm long, elliptic-lanceolate, 4–8 mm long, 1.5–4 mm wide; cauline leaves sessile, linear, 1.0–3.7 cm long, 0.5–1.7 mm wide, attenuate at apex, glabrous or with minute scabrous hairs above and on midrib below, glabrous below, with margin recurved, with midrib prominent below. Stipules fused and adnate to the leaf bases; stipule–sheath c. 0.7 mm long, glabrous or nearly so, produced into triangular lobe, margin entire or fimbriate. Inflorescences lax, terminal dichasial cymes with leaf-like bracts decreasing in size towards apex. Pedicels capillary, 15–27(–35) mm long. Calyx lobes 4, triangular, 0.5–1 mm long, shortly connate at base, with margin entire or minutely serrulate; sinus between lobes acute, colleters usually present between lobes. Corolla white, hypocrateriform, slightly wider at throat; tube 1.5–2.5(–4.5) mm long, sparsely covered with short erect hairs outside, with throat glabrous; lobes 4, elliptic, 1–2(–3.5) mm long, obtuse at apex, uncinate, with scattered hairs on lobes above anthers. Stamens included in the throat or slightly exserted; filaments 0.2–0.5 mm long; anthers oblong, 0.5–1 mm long. Ovary globose, 2-locular, 1–1.5 mm diameter, tuberculate. Style exserted from tube when mature, 2–3 mm long; stigma bifid; lobes filiform, 1–1.5 mm long, twisted, hairy. Placenta fleshy, peltately attached to septum; ovules 40–60/locule. Capsule crustaceous, globose, 2–2.5(–3) mm diameter, glabrous, crowned by a ring of persistent calyx lobes, beakless or nearly so, splitting loculicidally. Seeds minute, squat-angular, truncate at apex; testa reddish brown, reticulate. **Figs 2 & 5C.**

Selected specimens: Western Australia. GARDNER DISTRICT: Lake Argyle road between Dead Horse Springs and Spillway creek turn-off, Jul 1974, *Carr* 3133 & *Beauglehole* 46891 (PERTH). **Northern Territory.** DARWIN AND GULF DISTRICT: 67 km NE of Pine Creek, Ikoymarrua lookout, 13°31′S, 132°13′E, Apr 1989, *Halford* H72 (BRI); 35 km W of Cape Crawford Roadhouse along Carpentaria Hwy, 16°42′S, 135°23′E, Apr 1989, *Halford* H91 (BRI). VICTORIA RIVER DISTRICT: 35 km E of Kununurra, Keep River N.P., 15°51′S, 129°02′E, Apr 1989, *Halford* H58 (BRI). BARKLY TABLELAND DISTRICT: c. 27 km SW of 'Calvert Hills' on the road to 'Creswell Downs', 17°15′S, 137°10′E, May 1974, *Pullen* 9253 (DNA). **Queensland.** COOK DISTRICT: Lockerbie, 10 miles [16 km] WSW of Somerset, May 1948, *Brass* 18563 (BRI); 45 km NNW of Cooktown on road to Laura via 'Battle Camp', 15°17′S, 144°51′E, May 1989, *Halford* H120 (BRI); 15 km S of Cooktown on road to Lakefield, 15°35′S, 144°51′E, May 1989, *Halford* H122 (BRI); Near Mareeba, Apr 1967, *Pedley* 2278 (BRI); 4 miles [6 km] W of Mareeba, Apr 1967, *Pedley* 2241 (BRI). BURKE DISTRICT: About halfway between Croydon and "Esmeralda", Jul 1954, Blake 19598 (BRI). NORTH KENNEDY DISTRICT: halfway between Townsville and Rollingstone, 19°0–′S, 146°3–′E, Apr 1945, *Blake* 15762 & *Webb* (BRI). (16 specimens examined).

Distribution and habitat: Found across northern Australia from Kununurra, Western Australia to Cape York Peninsula, north-eastern Queensland **(Map 2)**. Occurs on shallow gravelly and loam soils and in poorly drained sandy soils in spinifex grasslands and *Melaleuca* and *Eucalyptus* woodlands on dissected hillslopes and rocky screes.

Relationships: *H. laceyi* resembles *H. leptocaulis* especially in habit, capsules, inflorescence and seeds, but differs from it in its hypocrateriform corollas, shorter staminal filaments (0.2–0.5 mm long) and shorter calyx lobes (0.5–1 mm long). In the vegetative state the two species could be confused. *H. laceyi* is similar to *H. largiflorens* but can be easily distinguished by its shorter stature and smaller flowers. *H. laceyi* differs from other Australian *Hedyotis* species by its globose capsule, peltate placenta and its slender stems.

Conservation status: *H. laceyi* is widely distributed and is known to be represented in conservation reserves. It is not considered to be endangered or threatened.

Etymology: Named in honour of Captain H.J. Lacey who worked as a pony express rider in north Queensland and carried the first mail from Cairns to Herberton in 1885.

Notes: The specimens *Carr* 3133 and *Halford* H58 have larger flowers and slightly larger capsules than all other specimens. Further material may reveal that these collections should be regarded as a distinct taxon but for the time being they are incorporated under *H. laceyi*.

Hedyotis thysanota Halford, **sp. nov.** *H. delicatam* simulat sed statura robustiore, inflorescentiis cymosis et ad marginibus loborum corollae pilosus distinguitur; a speciebus ceteris Australianis a charactere ultimo distinguitur. **Typus:** Northern Territory. DARWIN AND GULF DISTRICT: near Koongarra saddle, 1.5 km north of Koongarra, 12°51′S, 132°51′E, 22 May 1980, *M. Lazarides* 8899 (holo: DNA; iso: AD,BRI,CANB,MEL,NSW).

Annual diffuse herb, much branched at base. Branches erect or ascending. Stems slender, terete or slightly ribbed, glabrous. Leaves opposite; basal leaves sessile, linear to obovate, up to 5 mm long, sessile; cauline leaves sessile, linear, 1–2.5 cm long, c. 1 mm wide, narrowing towards base, acute at apex, glabrous, with margin somewhat recurved especially towards base, with midvein prominent below. Stipules fused and adnate to the leaf base; stipule-sheath c. 0.5 mm long, glabrous, produced into single sometimes bifid lobe, with fimbriate margins. Inflorescences 1 or 2 times dichasially branched then monochasial cymes. Bracts small, leaf-like at nodes, up to 7 mm long. Pedicels 2–20 mm long. Flowers paired at nodes of cymes, on unequal pedicels. Calyx lobes 4, linear (somewhat terete), 2–3.5 mm long, connate at base, slightly serrulate at apex; sinus between lobes acute, colleters present between lobes. Corolla pale purple, with veins darker in colour, hypocrateriform; tube 5–7.5 mm long, slightly wider and with ring of soft moniliform hairs at throat; lobes 4, elliptic, 3.5–5.5 mm long, 2–2.5 mm wide; margin of lobes pilose. Stamens exserted; filaments 1.5–2.5 mm long, erect, reflexed with age; anthers linear, c. 1 mm long. Ovary globose, 2-locular, c. 1 mm diameter, papillose. Style exserted from tube when mature, 6.5–8.5 mm long; stigma bifid; lobes filiform, 1.5–2 mm long, twisted, hairy. Placenta fleshy, peltately attached to septum; ovules 10–20/locule. Capsule crustaceous, globose, 1.5–2 mm diameter, sparsely papillose, persistent calyx lobes 2–3.5 mm long; beak slightly raised, rounded, splitting loculicidally. Seeds squat-angular, 0.5 mm across, truncate at apex; testa reticulate, black. **Figs 3 & 5D.**

Selected specimens: Northern Territory. DARWIN AND GULF DISTRICT: Nabarlek area, near water supply dam, 12°20′S,133°19′E, Apr 1979, *Rankin* 2058 (DNA); c. 30 km NNE of Jabiru, 12°25′S, 132°57′E, Mar 1981, *Craven & Whitbread* 7979 (CANB); c. 362 km E of Darwin between Mudginbarry [Mudginberri] Station and the East Alligator River, 12°28′S, 132°55′E, Jun 1974, *Pullen* 9434 (CANB); near East Alligator River, 12°2–′S, 132°5–′E, May 1975, *Gittins* 2885 (BRI,NSW); 2 km NNW of Koongarra saddle, 12°45′S, 132°55′E, Apr 1980, *Telford* 8142 & *Wrigley* (CANB); Koongarra jump-up, 12°49′S, 132°55′E, May 1978, *Dunlop* 4850 (DNA); Nourlangie Creek, 12°52′S, 132°47′E, Feb 1973, *Craven* 2451 (DNA,CANB); Waterfall Creek, 0.5 miles above falls, 13°25′S, 132°25′E, Apr 1969, *Byrnes* NB1527 (DNA). (13 specimens examined).

Distribution and habitat: Has been recorded only along the sandstone escarpment of Arnhem Land, Northern Territory **(Map 3)**, where it grows on shallow sandy soils over sandstone or sometimes on deep sand in shrublands or open woodlands on moist flats, depressions, hillslopes or on the margins of creeks associated with sandstone rocks.

Relationships: *H. thysanota* resembles *H. delicata* but can be distinguished from it by its stouter habit, cymose inflorescence and pilose margins of the corolla lobes. The latter character distinguishes it from other Australian *Hedyotis* species.

Fig. 3. *Hedyotis delicata*: A. habit × 0.3. B. flower × 6. C. corolla opened out, and style × 6. D. capsule × 6. *H. thysanota*: E. habit × 0.3. F. flower × 6. G. corolla opened out, and immature style × 6. G_1. mature style × 6. H capsule × 6. A–D, Halford H54; E–H, Halford H70.

Conservation status: Although it is relatively restricted in its distribution the majority of known populations are in Kakadu National Park. A conservation coding of 3R is therefore appropiate based on the criteria of Briggs and Leigh (1988).

Etymology: The specific epithet refers to the fringe of hairs on the margin of the corolla lobes.

Hedyotis delicata Halford, **sp. nov.** a speciebus ceteris Australianis, quamquam semina matura non visa, facile distinguitur; *H. thysanotam* morphologia florali simulat sed floribus solitariis axillaribus, ad marginibus loborum corollae pilosis carentibus et pilis retrorsis in caulibus foliisque praeditia differt; *H. galoidem* habitu et floribus solitarii axillaribus simulat sed corollis parvis tubularibus et capsulis ovoido-globularibus dissepimento sulcato praeditis distinguitur. **Typus:** Western Australia. GARDNER DISTRICT: 28 km S of Kununurra, east bank of spillway creek next to bridge on road to Ord Dam, 16°01′S, 128°47′E, 20 April 1989, *D. Halford* H54 (holo: BRI; iso: DNA,K,PERTH).

Slender, weakly ascending, annual herb single or multistemmed from base; branches supported by surrounding vegetation. Stems terete; indumentum retrorsely scabridulous. Leaves opposite; basal leaves petiolate, up to 1 mm long, obovate to elliptic, 2–6 mm long, 1–1.5 mm wide; cauline leaves sessile, linear, 6–20 mm long, up to 1 mm wide, acuminate at apex, scabridulous above and on midrib below, glabrous below, with margin recurved, with midrib prominent below. Stipules fused and adnate to the leaf base; stipule-sheath c. 0.5 mm long, glabrous or with retrorse scabrous hairs, drawn into single entire lobe (sometimes bifid), fimbriate on margin. Flowers solitary in upper leaf axils. Pedicels capillary, 10–30 mm long, retrorsely scabridulous. Calyx lobes 4, narrowly triangular, 1–2.5 mm long, minutely scabridulous, connate at base, acuminate at apex; sinus between lobes acute, colleters sometimes present between lobes. Corolla white, hypocrateriform, scabridulous outside, with ring of hairs at throat; tube 2.5–4.5 mm long, slightly wider at throat; lobes 4, ovate-elliptic, 1.5–3.5 mm long. Stamens exserted from tube; filaments 1–1.5 mm long, erect, reflexed with age; anthers oblong-linear, c. 0.7 mm long. Ovary globose, 2-locular, c.1 mm diameter, scabridulous. Style exserted from tube when mature, 3.5–5.5 mm long; stigma bifid; lobes filiform, 2–3 mm long, spreading, twisted, hairy. Placenta fleshy, peltately attached to septum; ovules 45–70/locule. Capsule crustaceous, globose, 1.5–2 mm diameter, glabrous or minutely scabridulous, with persistent calyx lobes 1–2.5 mm long; beak slightly raised, rounded. Mature seed not seen. **Fig. 3.**

Additional specimens examined: Western Australia. GARDNER DISTRICT: Aboriginal paintings area, 32 km WSW of Kununurra, Jul 1976, *Beauglehole* 54305 (PERTH); Near spillway, N end of Lake Arygle, Jun 1975, *George* 13171 (PERTH); Kununurra – Timber Creek road, 1.5 km W of Lake Argyle turn-off, Jul 1974, *Carr* 3030 & *Beauglehole* 46809 (MEL,PERTH).

Distribution and habitat: This species is found only in the area between the Northern Territory border and the Great Northern Highway in Western Australia **(Map 3).** This species occurs on seasonally moist sandy soils, in low sedgelands or grasslands on alluvial flats and shallow depressions.

Relationships: Although mature seeds of *H. delicata* have not been seen, this species is quite distinct from the other Australian species. It resembles *H. thysanota* in its flower morphology, but can be easily distinguished by its solitary axillary flowers, the absence of hairs on corolla lobe margins and the presence of retrorse hairs on stems and pedicels. *H. galioides* is similar in habit to *H. delicata* and has solitary axillary flowers but can be distinguished by its small tubular corollas and ovoid-globular capsule.

Conservation status: This species is presently known from four populations which are not in conservation reserves. A conservation coding of 2K is appropiate based on the criteria of Briggs and Leigh (1988).

Etymology: The specific epithet alludes to the overall delicate habit of the species.

Observations: From the examination of herbarium material and observations in the field it is apparent that *H. laceyi*, *H. thysanota*, *H. leptocaulis*, *H. delicata* and *H. largiflorens* all possess protandrous flowers. This has apparently not been reported in the literature in any other Australia species of *Hedyotis*. As the corolla lobes open at flowering the stamens are erect and yellow while the style is short and included well below the corolla

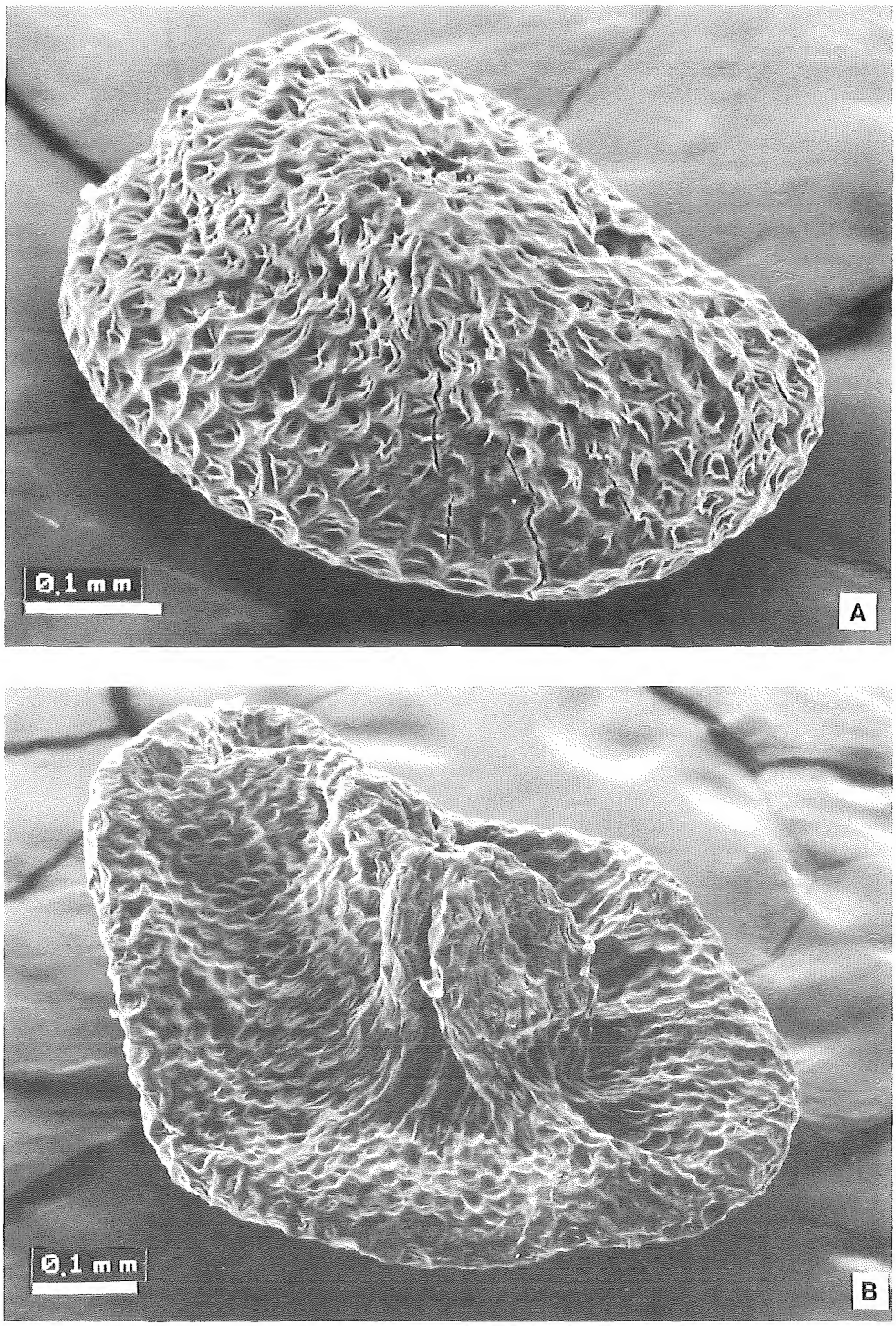

Fig. 4. Scanning electron micrographs of *Hedyotis* seeds mounted with hilum viewed obliquely from the side. A. *H. argillacea*. B. *H. coerulescens*.

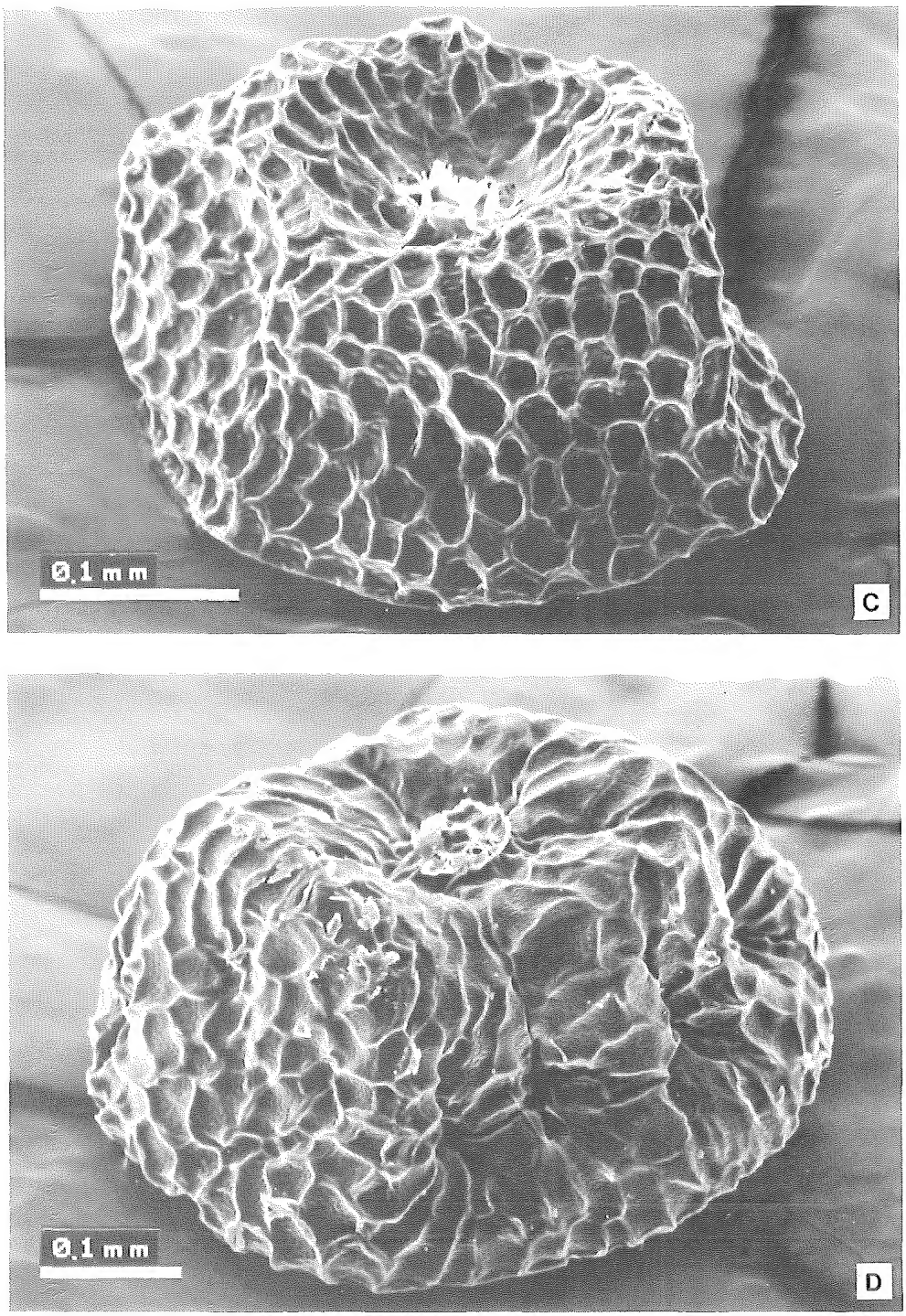

Fig. 5. Scanning electron micrographs of *Hedyotis* seeds mounted with hilum viewed obliquely from the side. C. *H. laceyi* D. *H. thysanota.*

throat with undeveloped stigmatic surfaces. In older flowers the anthers are empty of pollen and the style is exerted from the throat with well developed stigmatic surfaces.

Acknowledgements

I would like to express my appreciation to Bob Johnson, Director of Queensland Herbarium for encouraging my research and providing facilities at the herbarium. I am indebted to Les Pedley for providing the Latin diagnoses, to the anonymous referee and Rod Henderson for their helpful suggestions in improving the manuscript and to Will Smith for the illustrations. I would like to thank my parents for their assistance and diligence in the field. I extend my thanks to the directors of the following herbaria for making material available for study, AD, BRI, DNA, CANB, MEL, NSW, PERTH. A field trip to northern Australia was supported by a grant from the Australian Biological Resources Study (ABRS) in 1989.

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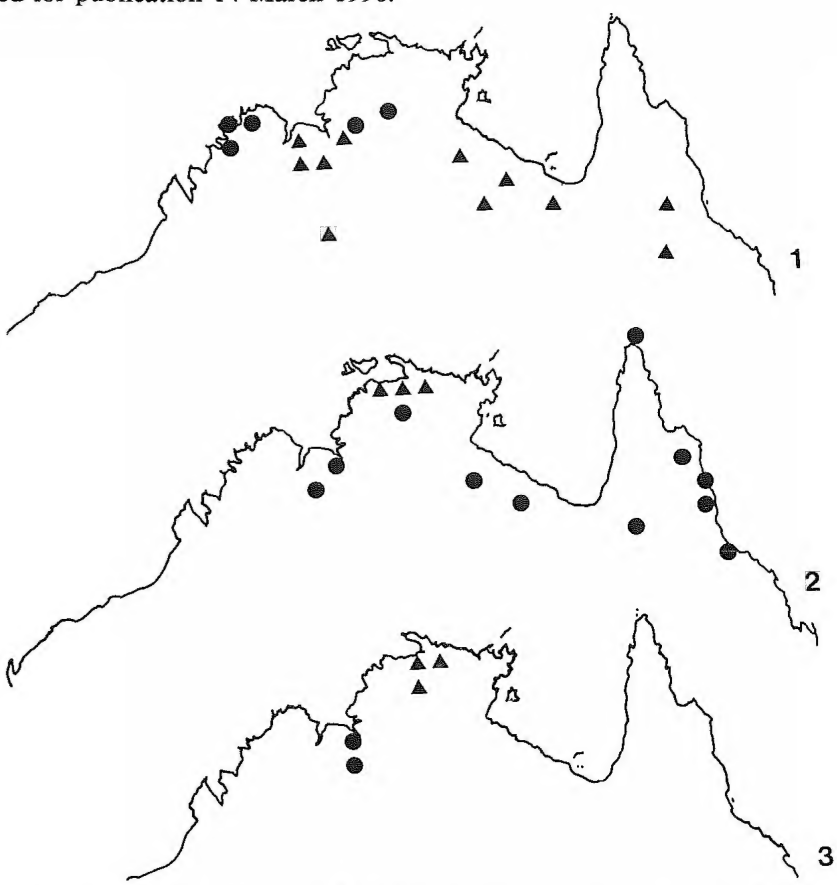
Accepted for publication 14 March 1990.



Maps 1–3. Distribution of *Hedyotis* spp.: 1. ● *Hedyotis largiflorens*, ▲ *H. argillacea*. 2. ● *H. laceyi*, ▲ *H. leptocaulis*. 3. ● *H. delicata*, ▲ *H. thysanota*.

Austrobaileya 3(2): 215–216 (1990)

NEW COMBINATIONS IN *ACACIA* MILLER (LEGUMINOSAE: MIMOSOIDEAE)

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Summary

Names of six species and five subspecies are transferred from *Racosperma* Martius to *Acacia* Miller.

Though the application of evolutionary thought to classification is not new, its resurgence in recent years has imparted a new philosophical framework to explain similarity of taxa (Estes & Tyril 1987). Classifications have come to be viewed primarily as reflections of patterns of evolutionary divergence and only secondarily as utilitarian devices. The utilitarian aspect is often seriously underestimated. Verdcourt (1989) stated the matter plainly: 'Systematic botany is not a rarefied study existing solely for the interest of its practioners. It is supposed to provide stable names for use of other people ...'. As long as taxonomic research continues, names will change, but due consideration should be given to the users of names: ecologists, biogeographers, biochemists, agriculturists, veterinarians, to name just a few.

Users of plant names in Australia are disadvantaged at present because of the situation in two genera of major economic importance, *Acacia* Miller and *Cassia* L. It has been proposed that each be divided into smaller genera. Problems in the two differ however.

The work of Irwin and Barneby (1982) who divided *Cassia sens. lat.* into three, reinstating *Senna* Miller and *Chamaecrista* Moench, has been generally accepted. Randell (1988, 1989) has begun making combinations under *Senna* for Australian species formerly referred to *Cassia*. It is important to note, however, that names of most taxa of *Senna* are still available to workers under *Cassia*.

Regrettably the same is not true of the *Acacia-Racosperma* situation. Debate on the segregation of *Racosperma* Martius and *Senegalia* Raf. from *Acacia* (Pedley 1986) continues (see Pedley (1989) for the latest contribution and references). Most taxa of *Racosperma* have not been formally transferred from *Acacia*. Consequently workers do not have a complete list of names for taxa of either *Acacia sens. lat.* or *Racosperma* in Australia.

I propose to remedy this situation in part in this paper by transferring some names published under *Racosperma* to *Acacia*. The more correct but more onerous task of transferring some 800 names from *Acacia* to *Racosperma* must wait until or after publication of the appropriate volume of the *Flora of Australia*. As a corollary of this, taxa described by me as new will, in future, be referred to *Acacia*, regardless of whether they more properly belong to *Racosperma* or *Senegalia*. Their names, and the ones below, are not to be considered invalid under Article 34 of the International Code of Botanical Nomenclature (1988). They are names of convenience, but are accepted by the author.

Acacia armillata (Pedley) Pedley, **comb. nov.**

Racosperma armillatum Pedley, Austrobaileya 2: 325 (1987).

Acacia blakei subsp. **diphylla** (Tindale) Pedley, **comb. nov.**

Acacia diphylla Tindale, Telopea 1: 79 (1975).

Racosperma blakei subsp. *diphyllum* (Tindale) Pedley, Austrobaileya 2: 345 (1987).

Acacia julifera subsp. **curvinervia** (Maiden) Pedley, **comb. nov.**

Acacia curvinervia Maiden, Proc. Roy. Soc. Queensland 30: 34 (1918).

Racosperma juliferum subsp. *curvinervium* (Maiden) Pedley, Austrobaileya 2: 571 (1988).

Acacia meiosperma (Pedley) Pedley, **comb. nov.**

Racosperma meiospermum Pedley, Austrobaileya 2: 321 (1987).

Acacia ommatosperma (Pedley) Pedley, **comb. nov.**

Racosperma ommatospermum Pedley, Austrobaileya 2: 327 (1987).

Acacia plectocarpa subsp. **tanumbirinensis** (Maiden) Pedley, **comb. nov.**

Acacia tanumbirinensis Maiden in Ewart & Davis, Fl. N. Territory: 338 (1917).

Racosperma plectocarpum subsp. *tanumbirinense* (Maiden) Pedley, Austrobaileya 2: 354 (1987).

Acacia polyadenia (Pedley) Pedley, **comb. nov.**

Racosperma polyadenium Pedley, Austrobaileya 2: 322 (1987).

Acacia racospermoides Pedley, **nom. nov.**

Racosperma paniculatum Pedley, Austrobaileya 2: 324 (1987); non *Acacia paniculata* Willd. (1805).

Acacia spirorbis subsp. **solandri** (Benth.) Pedley, **comb. nov.**

Acacia solandri Benth., Fl. austral. 2: 406 (1864).

Racosperma spirorbis ('*spirorbe*') subsp. *solandri* (Benth.) Pedley, Austrobaileya 2: 355 (1987).

Acacia stipuligera subsp. **glabrifolia** (Maiden & Blakely) Pedley, **comb. nov.**

Acacia stipuligera var. *glabrifolia* Maiden & Blakely, Proc. Roy. Soc. Queensland 38: 120 (1927).

Racosperma stipuligerum subsp. *glabrifolium* (Maiden & Blakely) Pedley, Austrobaileya 2: 356 (1987).

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RANDELL, B.R. (1989). Revision of the Cassineae in Australia. 2. *Senna* Miller sect. *Psilorhegma* (J. Vogel) Irwin and Barneby. *Journal of the Adelaide Botanic Gardens* 12: 165–272.

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Accepted for publication 20 March 1990

Austrobaileya 3(2): 217–234 (1990)

HOYA R. BR. (ASCLEPIADACEAE) IN AUSTRALIA – AN ALTERNATIVE CLASSIFICATION

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Summary

An alternative classification to that of Hill, of the species of *Hoya* R. Br. in Australia excluding the *H. australis* R. Br. ex Traill complex is given. Six species are described and illustrated with notes on variation, distribution, habitat and conservation status. *H. lauterbachii* Schumann is a widely distributed species in far north Cape York Peninsula, Queensland and in Papuasia. Flower shape and colour of *H. lauterbachii* varies considerably. *H. gigas* Schltr. and *H. coronaria* var. *papuana* Bailey are placed in synonymy with *H. lauterbachii*. *H. alata* K. Hill is reduced to synonymy with *H. pseudolittoralis* Hemsley. Variation in *H. macgillivrayi* Bailey and *H. nicholsoniae* F. Muell. is described. *H. litoralis* Schltr. is recorded for Australia. *H. serpens* J.D. Hook. is naturalised at one locality. A key to the species of *Hoya* recognised for Australia is given.

Introduction

The genus *Hoya* R. Br. was first validly published in Brown (1810a) and not in Brown (1810b) as listed in Farr *et al.* (1979). Brown (1810b) was issued as a preprint of Brown (1811) and was intended to be simultaneously published with Brown (1810a), but the Prodromus predates the preprint by some seven days (Mabberley 1985). Brown (1810b, 1811) unequivocally designated as type of his genus *Hoya* the species *H. carnosa* based upon *Asclepias carnosa* L.f.

Species of *Hoya* are widely distributed in the Indian subcontinent, China, south-east Asia, Malesia, New Guinea, Australia and some Pacific Island groups. Major centres of diversity for the genus would appear to be present in the Philippines and New Guinea. Rintz (1978) outlined in detail morphological variation in *Hoya* and this has been largely reiterated by Hill (1988) who also allocated the Australian taxa to the sections mainly formalised by Schlechter (1914). In the present paper we have not included the species in sections as we believe that an infrageneric classification is premature given the chaotic state of the majority of *Hoya* taxonomy.

The first species to be recorded for Australia was *H. carnosa* (Brown 1810a,b), although the Australian material seen by Brown was not conspecific with the type of this species which comes from China and Taiwan. This Australian material was subsequently described as *H. australis* R. Br. ex Traill by Traill (1830). Subsequent taxa with types based on Australian material were described by Mueller (1860, 1866), Bailey (1884, 1897, 1914) and Hill (1988). Considerable overlap in species of *Hoya* occurs between Australia and New Guinea and the last account of the genus in New Guinea is that of Schlechter (1914).

Taxonomy of the genus presents some difficulties because of the wide variation within and between species that we consider has not been satisfactorily addressed in the most recent work on the Australian taxa (Hill 1988). *H. australis* presents a taxonomic challenge because of its extensive range and variation. We believe that the variation within the *H. australis* group (incorporating *H. australis*, *H. keysii* Bailey, *H. dalrympleana* F. Muell., *H. sanae* Bailey ('*sana*'), *H. rupicola* K. Hill, *H. oligotricha* K. Hill and *H. oligotricha* subsp. *tenuipes* K. Hill) is best recognised with subspecific taxa as the variation is mainly vegetative with all the designated taxa having similar floral morphology. The variation in and classification of the *H. australis* complex in Australia will be addressed in a multivariate study in a separate publication (Forster & Liddle, unpubl. data).

Materials and Methods

Field collections have been made over a 10 year period and all taxa with the exception of *H. serpens* and *H. litoralis* have been examined in the field. All taxa have been grown in cultivation at Mareeba.

Descriptions have been prepared from live plants or spirit preserved material (indicated * in specimen citations). Herbarium holdings at AD, BRI, CANB (Australia only), DNA, JCT, MEL (New Guinea only), NE, PERTH and QRS and selected type material from A, B, BM and K have been examined. It was not possible to obtain herbarium holdings of *Hoya* from NSW and isotype material for *H. alata* K. Hill described by Hill (1988) has not been received at BRI as of February 1990. Duplicates listed for other herbaria in the NGF (New Guinea Forestry) series distributed by LAE have not been seen. An index to all numbered collections seen is given at the end of the paper to enable curation of the extensive NGF series.

Taxonomic Treatment

Hoya R. Br., Prodr. 459 (1810). **Type:** *Asclepias carnosa* L.f. (= *Hoya carnosa* (L.f.) R. Br.).
R. Br., Asclepiadeae 15 (1810); Mem. Wern. Nat. Hist. Soc. 1: 26–27 (1811); Wight, Contrib. bot. India 35–39 (1834); Endl., Gen. pl. 595–596 (1838); Decne. in DC., Prodr. 8: 634–639 (1844); Blume, Rumphia 4: 29 (1849); Benth., Fl. austral. 4: 346–347 (1869); Benth. in Benth. & J.D. Hook, Gen. pl. 2: 776–777 (1876); J.D. Hook., Fl. Brit. India 4: 53–62 (1885); Schumann in Engl. & Prantl., Nat. Pflanzenfam. 4(2): 289–291 (1897); Bailey, Queensl. fl. 3: 1012–1013 (1900); Schumann & Lauterb., Fl. Schutzgeb. Südsee 512–514 (1901); Schltr., Nachträge Fl. Schutzgeb. Südsee 362–367 (1905); Bot. Jahrb. Syst. 50: 104–138 (1914); Merrill, Enum. Philipp. fl. pl. 351–354 (1923); Ridley, Fl. Malay Peninsula 2: 393–402 (1923); Tsiang, Sunyatsenia 3: 169–180 (1936); Sunyatsenia 4: 124–126 (1939); Bakhuizen van den Brink, Blumea 6: 378–381 (1950); Backer & Bakhuizen van den Brink, Fl. Java 2: 266–271 (1965); Tsiang & Li, Act. Phytotax. Sin. 12: 120–127 (1974); Rintz, Malay. Nat. J. 30: 467–522 (1978); Lu & Kao, Fl. Taiwan 4: 238 (1981); Ali, Fl. Pakistan 150: 38 (1983); Huber, Rev. Handbk. Fl. Ceylon 4: 109–111 (1983); Liddle, Hoya in Australia 1–34 (1986); Hill, Telopea 3: 241–255 (1988).

Sperlingia Vahl, Skr. Natur. hist. Selsk. 6: 112 (1810). **Type:** *S. verticillata* Vahl (= *Hoya verticillata* (Vahl) G. Don).

Schollia J.F. Jacq., Eclog. Pl. Rar. 1: 5, t. 2 (1811). **Type:** *S. crassifolia* J.F. Jacq. (= *Hoya carnosa* (L.f.) R. Br.).

Pterostelma Wight, Contrib. bot. India 39 (1834). **Type:** *P. acuminata* Wight (= *Hoya acuminata* (Wight) Benth.).
Endl., Gen. pl. 596 (1838); Decne. in DC., Prodr. 8: 633 (1844).

Physostelma Wight, Contrib. bot. India 39 (1834). **Type:** *P. wallichii* Wight (= *Hoya campanulata* Blume).
Endl., Gen. pl. 596 (1838); Decne. in DC., Prodr. 8: 633 (1844); Benth. in Benth. & J.D. Hook, Gen. pl. 2: 777 (1876); J.D. Hook., Fl. Brit. India 4: 62–63 (1885); Schumann in Engl. & Prantl., Nat. Pflanzenfam. 4(2): 289 (1897); Backer & Bakhuizen van den Brink, Fl. Java 2: 265 (1965).

Cyrtoceras Bennett, Pl. jav. rar. 90, t. 21 (1838). **Type:** *C. reflexum* Bennett, (= *Hoya multiflora* Blume).

Centrostemma Decne., Ann. Sci. Nat. (Paris) ser. 2(9): 271, t. 12 (1838). **Type:** *C. multiflorum* (Blume) Decne. (= *Hoya multiflora* Blume).
Decne. in DC., Prodr. 8: 634 (1844); Tsiang, Sunyatsenia 3: 168 (1936); Sunyatsenia 4: 124 (1939).

Cystidianthus Hassk. in Hoev. & de Vriese, Tijdschr. Natuurl. Gesch. Physiol. 10: 125 (1843). **Type:** *C. campanulatus* (Blume) Hassk. (= *Hoya campanulata* Blume).

Plocostemma Blume, Mus. bot. 1: 59 (1849). **Type:** not designated.

Acanthostemma Blume, Mus. bot. 1: 57 (1849). **Type:** not designated.

Cathetostemma Blume, Mus. bot. 1: 59 (1849). **Type:** *C. laurifolium* (Decne.) Blume (= *Hoya laurifolia* Decne.).

Otostemma Blume, Mus. bot. 1: 59, t. 11 (1850). **Type:** *O. lacunosum* (Blume) Blume (= *Hoya lacunosa* Blume).

Vines or shrubs, usually twining, with white or occasionally clear latex, terrestrial, epiphytic or lithophytic. Stems slender, rarely becoming corky. Roots fibrous, nodal or intranodal. Leaves opposite when mature, alternate on seedlings, coriaceous, fleshy or rarely succulent, elliptic, ovate, rhomboid, narrowly lanceolate or lanceolate, primary venation pinnate or palmate; margins entire, glabrous or with indumentum, with or without glands at the base of the lamina. Inflorescence pseudomonochasial with the cymes appearing at nodes between the pairs of leaves, becoming racemiform with age and producing flowers for several seasons in most species; cymes 1–many-flowered. Calyx 5-parted; lobes triangular, ovate-oblong, acute, generally with glands at base. Corolla white, pinkish white, green, yellow, red or pink; deeply 5-lobed, rotate or campanulate, fleshy or waxy; lobes membranous, fleshy, valvate in bud, margins often recurved, generally glabrous without, often papillose or with short indumentum within. Staminal corona single, consisting of 5 large, fleshy, horizontally spreading lobes attached to the staminal column; each lobe with parallel, inrolled keels. Anthers with short incurved terminal appendage. Pollinaria comprising 2 pollinia; pollinia smooth, erect, 1 in each anther cell, oblong to ovate-oblong, with or without a pellucid margin; corpusculum oblong; caudicles winged or unwinged for part or whole length. Gynostegium conical with obtuse style-head generally enclosed by stamens; ovaries free, glabrous. Follicles fusiform or terete-ovoid, smooth or roughened, rarely paired. Seeds flat, ovate, brown, comose at micropylar end.

Hoya contains over 100 species, with seven in Australia.

Key to the species of *Hoya* in Australia

1. Flowers more than 3.0 cm diameter 2
   Flowers less than 3.0 cm diameter 3

2. Coronal lobes 3–4.5 mm long, pollinia lacking a pellucid margin . . . . . **1. H. lauterbachii**
   Coronal lobes 10–12 mm long, pollinia with a pellucid margin . . . . . **2. H. macgillivrayi**

3. Venation acrodromous, leaves distinctly 3-veined above . . . . **3. H. nicholsoniae**
   Venation not distinctly acrodromous, leaves not distinctly 3-veined above 4

4. Pedicels equal, venation pinnate . . . . . **H. australis** complex
   Pedicels unequal, venation obscurely subparallel 5

5. Petals strongly reflexed, outer tip of corona lobe divided . . . . . **4. H. litoralis**
   Petals not strongly reflexed, outer tip of corona lobe not divided 6

6. Leaf surface smooth; flowers 7–8 mm diameter . . . . . **5. H. pseudolittoralis**
   Leaf surface papillose; flowers 15–16 mm diameter . . . . . **6. H. serpens**

1. **Hoya lauterbachii** Schumann, Monatsschr. Kakt.-Kunde. 6(1): 7–8 (1896). **Type:** Nordöstl. Neu-Guinea: im Walde am Mittellauf des Gogol-Flusses, 10 November 1890, *C. Lauterbach* 930 (holo: B†).
Schltr., Bot. Jahrb. Syst. 50: 136 (1914); Forster & Liddle in Williams, Native Pl. Queensl. 4: 230 (1990).

Hoya coronaria var. *papuana* Bailey, Queensl. Agric. J. 3: 156 (1898), **synon. nov. Type:** Foot of Mt Trafalgar, New Guinea, undated, *F.M. Bailey* (holo: BRI[AQ360787]).

Hoya gigas Schltr., Bot. Jahrb. Syst. 50: 136 (1914). **synon. nov. Type:** Nordöstl. Neu-Guinea: auf Bäumen in den Wäldern auf dem Gomadjidji, am Waria, *ca* 450 m u. M., May 1909, *Schlechter* 19389 (holo: B (photo!)).
Schltr., Asclep. German New Guinea, III. Hoya R. Br. (Engl. Transl.) 33 (1981); Burton, Hoyan 5: 46–48 (1983).

Hoya sp., Liddle, Hoya in Australia 26, 28–33 (1986); Jones & Gray, Climbing Pl. Austral. 237, 252 (1988).

[*Hoya rubida* auct. non Schltr.; Jones & Gray, Austral. Climbing Pl. 126–127 (1977)].

Perennial vine, with white latex. Stems twining, cylindrical, to 5 mm diameter, with indumentum of uniseriate hairs or hispid with stiff black bristles; internodes variable in length to 8 cm. Leaves petiolate; lamina ovate to oblong, up to 13 cm long and 7.5 cm wide, with up to 6 brochidromous anastomosing lateral veins, base cordate to sharply truncate, apex mucronulate, upper surface minutely and sparsely puberulous to glabrous, yellowish green, light green or dark green, under surface densely puberulous to glabrous, paler than upper; petiole 1–4 mm long, 3–4 mm wide, with dense indumentum; extrafloral nectaries 2 at the junction of the petiole and lamina. Inflorescence with 1–8 flowers; peduncle to 4.5 cm long, 4–6 mm diameter, with dense indumentum, green. Flowers 3.5–5.5 cm diameter; pedicels 2–3.5 cm long, 2–3 mm diameter, with sparse to dense indumentum, green. Sepals lanceolate-ovate to ovate, 5–7 mm long, 2–4 mm wide, with 1 gland at each sinus. Corolla campanulate, minutely puberulous with white hairs or glabrous with a shiny appearance; deep red, red, brown, pink, yellow, yellow with pink longitudinal streaks alternating with corona, or cream; lobes reflexed, inflexed or horizontal, 8–15 mm long, 12–17 mm wide, tips acute. Corona inserted on top 3 mm of staminal column, 0.8–1.5 cm diameter; lobes ovate, broadly acute at tip, 4–5 mm long, 2.5–4 mm wide, variously coloured as with corolla, but generally yellow with edges of a different colour. Staminal column sunken into corolla base for 1–2 mm or not sunken at all, 6–7 mm long, 6–7 mm diameter. Anther membranes acute, 1.3–1.5 mm long, 1.4–1.5 mm wide. Slit between anther wings 1.5–2 mm long. Style-head not exceeding anthers, c. 2 mm diameter. Ovaries free, glabrous, c. 4 mm long and 3 mm wide. Pollinaria 1–1.3 mm long, 1.2–2 mm wide; pollinia horizontal to erect, without pellucid margin, 0.7–0.75 mm long, 0.3–0.35 mm wide; corpusculum 0.7–0.8 mm long, truncate at top and 0.4–0.45 mm wide, tapering to c. 0.2 mm wide at bottom; caudicles geniculate in middle, segment nearest to corpusculum winged, 0.5–0.7 mm long, 0.2 mm wide, segment nearest to pollinia not winged, c. 0.3 mm long and 0.05 mm wide. Follicles 14–16 cm long and 3 cm diameter. Seed oblong, light-tan, 7–8 mm long, 2–3 mm wide; coma 18–20 mm long, white. **Figs 1 & 2.**

Selected Specimens (21/79): **Indonesia. Irian Jaya.** Tabati, Jautefa Bay, Jun 1938, *Brass* 8847 (BRI; A *n.v.*). **Papua New Guinea.** West Sepik District: Meinat flood plain N slopes Bewani Mts, 11 km SSW of Bewani, 3°08′S, 141°08′E, *Wiakabu et al.* NGF50603 (BRI; L,LAE *n.v.*). Western District: 9 miles [15 km] from Kopiago on Korobe Road, 5°22′S, 142°33′E, Nov 1968, *Womersley, Vandenberg & Galore* NGF37343 (BRI; L,LAE *n.v.*). New Britain: Upper Johanna River, in foothills of Whiteman Range, Gasmata, 5°55′S, 150°05′E, Mar 1966, *Frodin* NGF26510 (BRI; A,CANB,K,L,LAE *n.v.*). Madang District: Aiome, 5°05′S, 144°05′E, Mar 1968, *Katik* NGF32774 (BRI; A,BISH,BO,BM,CANB,K,L,LAE,NSW,PNH,SING,US *n.v.*). Bougainville: Arawa Plantation, 6°15′S, 155°40′E, Apr 1970, *Millar & Vandenberg* NGF48509 (BRI; CANB,L,LAE *n.v.*). Morobe District: Watut Road, Golden Pines, 7°10′S, 146°37′E, Mar 1967, *Streimann & Kairo* NGF35649 (BRI; A,BO,CANB,K,L,LAE,NSW,SING *n.v.*); Lasanga Is, 7°25′S, 149°15′E, Nov 1969, *Streimann* NGF44288 (BRI; A,BO,CANB,K,L,LAE *n.v.*). Gulf District: Kaintiba – Bema Road, 4 km N of Kaintiba, 7°29′S, 146°00′E, Jan 1983, *Kairo* 589 (BRI; A,BFC, CBG,K,L,LAE,QRS,UPNG *n.v.*). Central District: Tapini area, 8°18′S, 146°48′E, May 1971, *Lelean* NGF46375 (BRI; CANB,L,LAE *n.v.*). Northern District: South of Biniguni Village, 9°40′S, 149°10′E, Jun 1972, *Womersley & Katik* NGF43983 (BRI; L,LAE *n.v.*). Milne Bay District: Fife Bay, Oct 1930, *Turner* 55 & 56 (BRI). **Solomon Islands.** Njapuana Is, Sep 1945, *Walker & White* BSIP141 (BRI). **Australia. Queensland.** Cook District: Punsand Bay, 10°44′S, 142°27′E, *Liddle* IML177 (BRI*); Bamaga, 10°44′S, 142°28′E, *Liddle* IML175, 176 (BRI*); Hann Ck, *Lavarack* IML529 (BRI*); Mt Tozer, *Liddle* IML281 (BRI*); 10 miles [16.7 km] NE of Iron Range, Apr 1944, *Flecker* [AQ216598] (BRI); Lamond Hill, Iron Range, 12°43′S, 143°18′E, Apr 1988, *Forster* 4210–4213, 4215–4221 & *Liddle* (BRI*); Garraway Ck Rockpiles, 12°45′S, 143°11′E, Apr 1988, *Forster* 4236, 4241 & *Liddle*

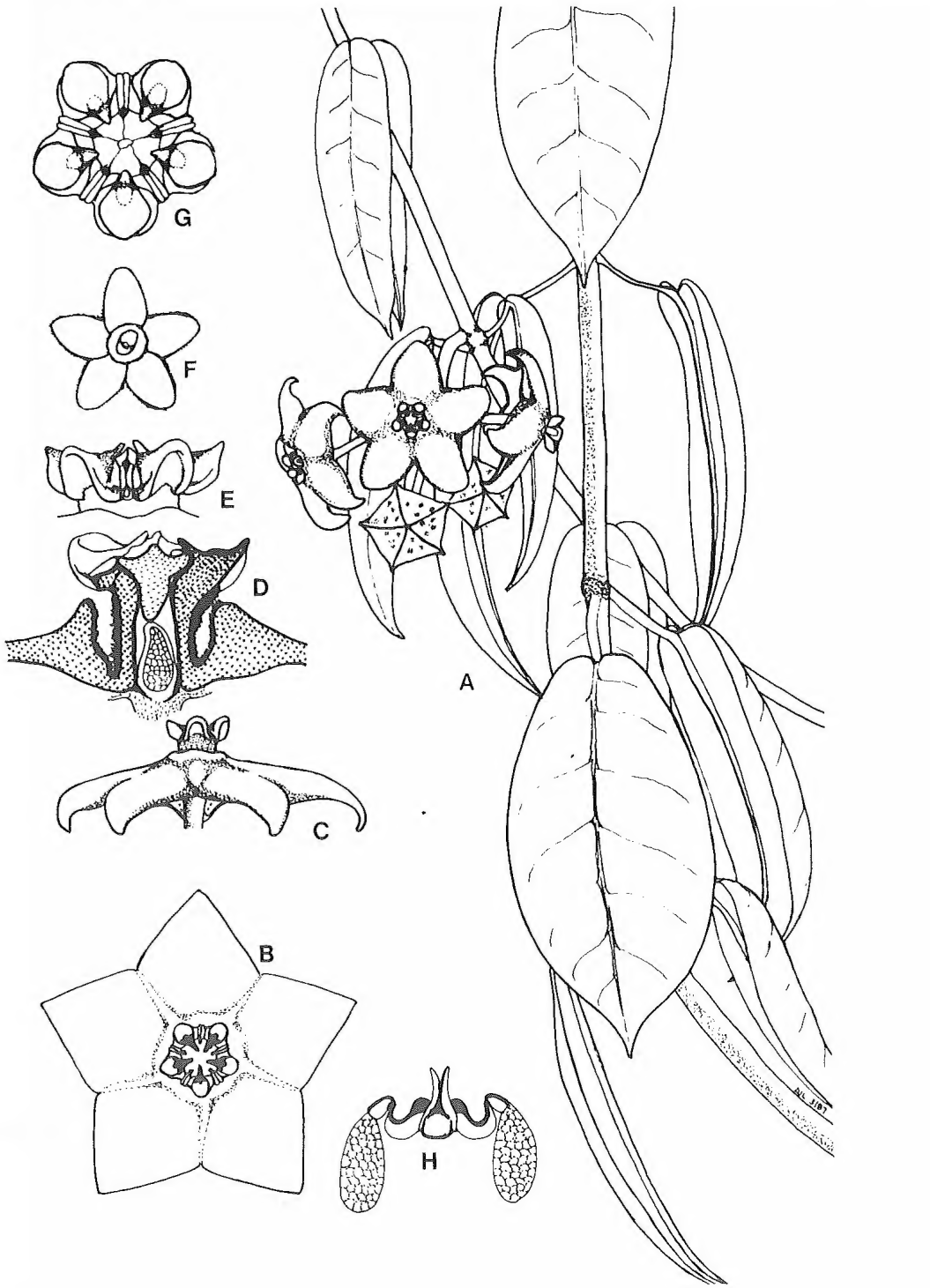

Fig. 1. *Hoya lauterbachii*: A. habit of flowering plant × 0.5. B. apical view of flower × 1. C. lateral view of flower demonstrating the reflexed nature of the corolla and the exserted nature of the staminal column and staminal corona × 1. D. lateral T.S. of staminal column and staminal corona × 2.5. E. lateral view of staminal corona × 2.5. F. apical view of calyx and ovaries × 2.5. G. apical view of staminal column × 2.5 H. pollinarium × 16. All from live material of Lavarack IML529.

(BRI*); McIlwraith Range, 13°53'S, 143°17'E, Apr 1979, *Liddle* IML10 (BRI*); Massey Ck, Oct 1986, *Gray* 4370 (QRS).

Distribution and habitat: *H. lauterbachii* is widely distributed in New Guinea and islands such as Bougainville. In Australia, this species is restricted to the rainforest communities near Bamaga, the Iron and McIlwraith Ranges and Glennie tableland (**Map 1**). *H. lauterbachii* occurs in a variety of rainforest types including microphyll and notophyll deciduous vine thickets, notophyll vine forest and mesophyll palm vine forests. Plants may be epiphytic or lithophytic. Parent rock types are variable, but primarily volcanics with granites and basalts represented. Collections have been recorded from near sealevel to 200–300 m in Australia and up to 1000 m in Papua New Guinea. In Australia, *H. lauterbachii* may grow in association with *H. nicholsoniae*, *H. pseudolittoralis*, *H. australis* subsp. *sanae* (Bailey) K. Hill and the taxon named as *H. oligotricha* subsp. *tenuipes* K. Hill.

Notes: This species has remained somewhat of an enigma, in so much as the name has not been applied either to plants in cultivation or in herbarium collections. It has long been recognised that a species of *Hoya* belonging to the Section *Eriostemma* existed in far north Cape York Peninsula, Queensland, with apparently the first collection being made by Hugo Flecker in 1944. Plants of this taxon have been misidentified in the past as *H. rubida* Schltr. (Jones & Gray 1977) a taxon which is not closely related to *H. lauterbachii*. Hill (1988) omitted *H. lauterbachii* entirely. However it could be the taxon referred to on page 241 of his account:

> "One group of taxa, represented in Australia by a single undescribed species, differs markedly in a range of key diagnostic characters from *Hoya s. str.* A study of *Hoya* and related genera had led to the removal of this group to a new genus (*Eriostemma* (Schltr.) K. Hill, Hill in prep.)."

After examination of the type sheet of *H. gigas* and accompanying sketches by Schlechter, and the illustration of *H. lauterbachii*, we believe that the taxon that occurs in Australia and commonly in Papua New Guinea is *H. lauterbachii*. *H. lauterbachii* was probably described from cultivated material which undoubtedly provided the material drawn in the illustration accompanying the original description. *H. gigas* Schltr. was described and illustrated by Schlechter (1914), based on material he collected in what was then German New Guinea (now Papua New Guinea). Schlechter placed his new species in the Section *Eriostemma* and allied it to *H. lauterbachii*, but considered it to differ in the shape of the corolla and the degree of development of indumentum present around the base of the staminal column.

Bailey (1898) described *Hoya coronaria* var. *papuana* Bailey from Papua New Guinea, distinguishing his variety from *H. coronaria* by "The flowers seem very near *H. coronaria* Blume, but without the scattered purple dots on the flowers of that species." Examination of the type of this name revealed that it is identical with *H. lauterbachii*.

Another yet earlier name that could perhaps be applied to this taxon, is *H. neoguineensis* Engl. We have not seen any type material (presumably at Berlin and destroyed) and the original description is not sufficiently detailed to unequivocally place the name with the species considered here.

H. lauterbachii is a remarkably variable species. Flower colour is highly variable with corolla and corona colours ranging from deep red, to various shades of pink, yellow, yellow with pink longitudinal streaks, and cream (two forms are shown in Forster & Liddle 1990). Flower colour varies with respect to conditions of growth, as the same clone may produce flowers of a different colour in different growing seasons.

The relative position of the staminal column and corona in relation to the corolla is also very variable with the staminal column being well exserted from the corolla in some clones (in association with reflexed corolla lobes) or being well sunken into the corolla (Figs 1 & 2, Liddle 1986). Until relatively recently (Liddle 1986), the few clones in cultivation had produced flowers that may be viewed as extremes of this variation range. During April 1988, some ten clones (*Forster* 4210–4213, 4215–4221 & *Liddle*) were collected in flower at Lamond Hill, Iron Range over a distance of c. 100 m. Flower colour of these clones ranged from deep red to yellow-cream. One clone had strongly reflexed corolla lobes, as had been found for material from Punsand Bay and Bamaga,

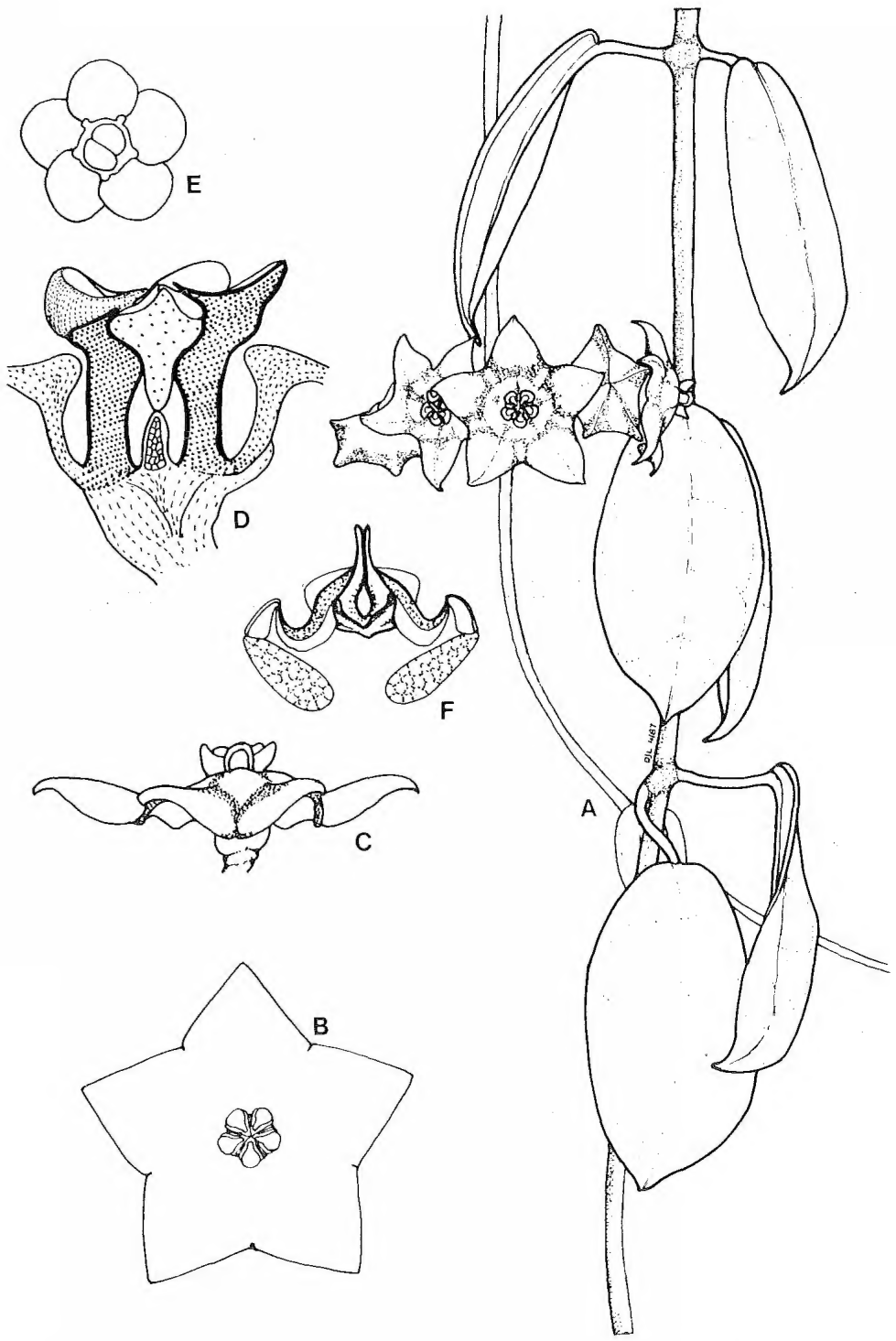

Fig. 2. *Hoya lauterbachii*: A. habit of flowering plant × 0.5. B. apical view of flower × 1. C. lateral view of flower demonstrating the non-reflexed corolla × 1. D. lateral T.S. of staminal column and staminal corona × 2.5. E. apical view of calyx and ovaries, showing glands × 2.5. F. pollinarium × 16. All from live material of Liddle IML176.

but the majority had non-reflexed lobes. The number of flowers in an inflorescence, the leaf shape and pubescence were also highly variable.

Given the many intermediates that exist between the extremes of variation outlined, only one species should be recognised for this material. These observations have obvious implications elsewhere in the genus. Many taxa of *Hoya* are only known from the type collection or relatively few collections in herbaria or cultivation. If the amount of variation that occurs in *H. lauterbachii* is repeated in other species, then it is likely that some of the so called "species complexes" will resolve into "complex species" instead. Furthermore, again due to the variation encountered both within and between different species of *Hoya*, we believe that there are insufficient grounds on which to fragment the genus as proposed by Hill (1988).

Conservation status: *H. lauterbachii* is widespread in far north Queensland and in New Guinea and is not endangered, threatened or rare at present.

2. Hoya macgillivrayi Bailey, Queensl. Agric. J. n.s. 1: 190, Fig. 14 (1914). **Type:** Claudie River, Lloyd Bay, undated, *W. Macgillivray* s.n. (holo: BRI[AQ333104]).
Jones & Gray, Austral. Climbing Pl. Fig. 121 (1977); Silverman, Hoyan 1: 14–16 (1979); Lavarack, Hoyan 5: 3–6 (1983); Williams, Native Pl. Queensl. 2: 160 (1984); Liddle, Hoya in Australia 17, 21–24 (1986); Hill, Telopea 3: 248 (1988); Liddle, Hoyan 10: 2–4 (1988); Jones & Gray, Climbing Pl. Austral. 251 (1988).

Perennial vine, with white latex, epiphytic or rarely lithophytic. Stems twining, cylindrical, up to 5 mm diameter, glabrous; internodes up to 2 cm long. Leaves petiolate; lamina ovate to lanceolate, 15–20 cm long, 2.5–8 cm wide, glabrous, tip acute, base cordate, venation indistinct on both surfaces, midrib prominent, dark green when mature, coppery when juvenile; petiole 2–3.5 cm long, 2–5 mm diameter; extrafloral nectaries 2–5 at join of petiole and lamina base. Inflorescence with up to 12 flowers; peduncle 4–20 cm long, 1–2 mm diameter, glabrous, green to yellowish. Flowers 5.5–8 cm diameter; pedicels 5.4–8.5 cm long, 1.5–2 mm diameter, glabrous, green. Sepals acute, 3–4 mm long, c. 2 mm wide. Corolla campanulate, centre white or entirely dark red; lobes sharply acute with edges extremely recurved, 2–2.5 cm long, 1.9–2.3 cm wide. Staminal corona c. 1 cm long, 1.8–2.4 cm diameter, centre raised above, or flush or sunken below surface of corolla, glabrous; lobes linear, 10–12 mm long, 2–3 mm wide, inner end not acutely raised above outer end, outer end broadly ovate, or inner end acutely raised to at least 0.5 cm above the outer end, and the outer tip of the lobe pointed and sharply raised. Staminal column 8–9 mm long, 3–4 mm diameter. Anther membranes acute, c. 2.5 mm long. Slit between anther wings 3–3.4 mm long. Style-head not exceeding anthers, c. 3 mm diameter. Ovaries glabrous, c. 4 mm long and 2 mm wide. Pollinaria 2–2.2 mm long, 1.1 mm wide. Pollinia oblong, c. 1.4 mm long and 0.45 mm wide; corpusculum 0.77–0.8 mm long, 0.47–0.5 mm wide; caudicles c. 0.4 mm long and 0.2 mm wide. Follicles and seed not seen. **Fig. 3.**

Specimens examined. Queensland. COOK DISTRICT: Tozers Gap, May 1948, *Brass* 19447 (BRI,CANB; A *n.v.*); ditto, Oct 1986, Gray 4374 (QRS); Puffdelooney Ridge, 12°44′S, 143°12′E, Oct 1980, *Hyland* 10826 (QRS); Iron Range, Jul 1981, *Simmons* 2 & 3 (BRI); T.R. 14, Massey River, *Hodge* IML17 (BRI*); ditto, Nov 1980, *Gray* 1831 (QRS); T.R. 14, Leo Ck road, 13°40′S, 143°20′E, Sep 1972, *Hyland* 6377 (QRS); ditto, Sep 1972, *Hyland* 6378 (BRI); Massey Gorge, 13°49′S, 143°24′E, Sep 1979, *Clarkson* 2618 (BRI); Langkelly Ck, 13°51′S, 143°18′E, Apr 1979, *Liddle* IML15 (BRI*); Coen River, 13°52′S, 143°14′E, Jun 1979, *Liddle* IML16 (BRI*); Rocky River, 13°15′S, 143°25′E, Sep 1973, *Dockrill* 706 (BRI,CANB,QRS); ditto, Oct 1969, *Webb & Tracey* 9428 (BRI).

Distribution and habitat: *H. macgillivrayi* is restricted to the Iron and McIlwraith Ranges (**Map 2**) where it occurs in diverse habitats ranging from notophyll vine forests, deciduous forests and swamps. It may be locally abundant.

Notes: *H. macgillivrayi* is closely allied to *H. archboldiana* Norman and *H. megalaster* Warb. from New Guinea (Liddle 1988). Staminal corona form is variable in the material examined of *H. macgillivrayi* and two very distinct forms are presently in cultivation. The size and colour of individual flowers may also vary both with individual and growing conditions.

Conservation status: As *H. macgillivrayi* is popular in cultivation, there is potentially some pressure on wild populations, particularly in the acquisition of differing coronal and colour forms. As a wide range of material is now in cultivation, this collector

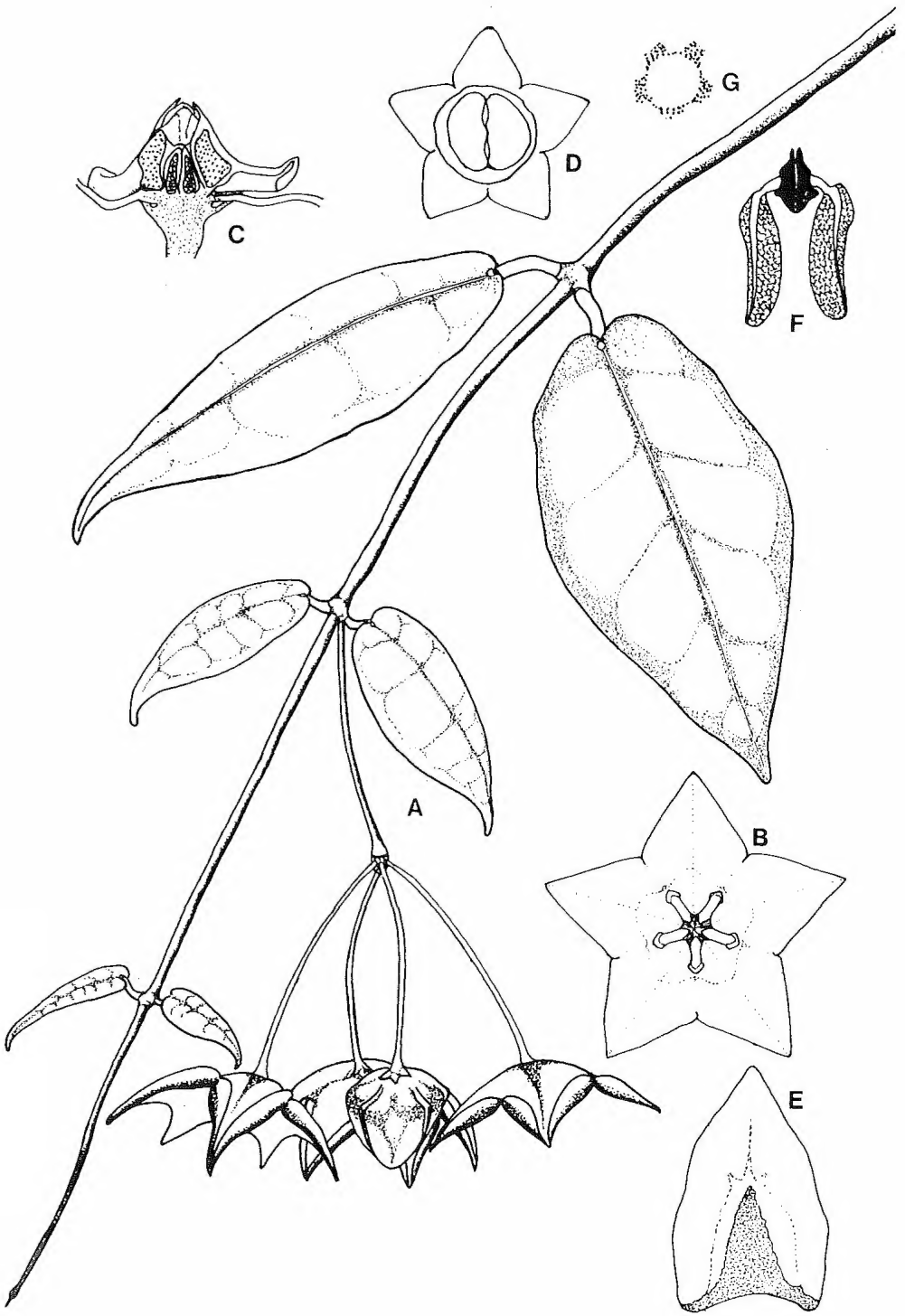

Fig. 3. *Hoya macgillivrayi*: A. habit of flowering plant × 0.5. B. apical view of flower × 0.5. C. lateral view of T.S. of staminal column and staminal corona × 1.5. D. apical view of calyx and ovaries × 3. E. anther membrane × 10. F. pollinarium × 25. G. hairs from around base of staminal corona × 25. All from live material of Liddle IML15.

demand should be satisfied to a large extent. Rating 3RC: Iron Range (Briggs & Leigh 1988).

3. Hoya nicholsoniae F. Muell., Fragm. 5: 159 (1866). **Type:** 'In arboribus ad sinum litoreum Rockingham's Bay. *Dallachy*' (holo: MEL *n.v.*).
F. Muell., Fragm. 9: 71, 190 (1875); Benth., Fl. austral. 4: 347 (1867); Bailey, Syn. Queensl. fl. 319 (1883); Catal. pl. Queensl. 30 (1890); Queensl. fl. 3: 1013 (1900); Comprh. cat. Queensl. pl. t. 311 (1913); Domin, Biblioth. Bot. 89(6): 1086 (1928); Jones & Gray, Austral. Climbing Pl. Fig. 123 (1977); Williams, Native Pl. Queensl. 1: 160 (1979); Liddle, Hoya in Australia 17, 19–20 (1986); Hill, Telopea 3: 248–249 (1988); Jones & Gray, Climbing Pl. Austral. 251 (1988).

Perennial vine, with white latex, epiphytic or lithophytic. Stems twining, glabrous, to 5 mm diameter; internodes variable in length to 20 cm. Leaves petiolate; lamina fleshy to coriaceous, broad-ovate to ovate, 4.5–21 cm long, 4.5–10 cm wide, base cordate, tip acute, broadly pinnately veined, green to purple or brown; petioles 2–3 cm long, 3–8 mm diameter; extrafloral nectaries 4 or 5 or coalesced into a ridge at the junction of the petiole and lamina base. Inflorescence pseudomonochasial with up to 40 flowers; peduncle up to 12 cm long and 2 mm diameter, glabrous, green to purplish. Flower 10–18 mm diameter; pedicels pink to cream, 18–30 mm long, c. 1 mm diameter, glabrous. Sepals triangular, 1.5–3 mm long, c. 2 mm wide. Corolla rotate, generally reflexed, pale yellow, cream, green or flesh pink, minutely puberulent; lobes ovate to lanceolate-ovate, 6–7 mm long, 4.5–6 mm wide. Staminal corona 2–3 mm long, 7–8 mm diameter, inserted on top 2–2.5 mm of staminal column; lobes rhomboid, the outer edge usually pointed but occasionally rounded, ridged longitudinally above, with two longitudinal inrolled keels below, 3–4 mm long, 2–2.5 mm wide, same colours as corolla, or commonly paler. Staminal column c. 2.5 mm long, 4–5 mm diameter. Anther membranes triangular, c. 1 mm long and 1 mm wide. Slit between anther wings c. 1 mm long. Style-head not exceeding anthers, c. 1.5 mm wide. Ovaries glabrous, 1.5–2 mm long, c. 1.5 mm wide. Pollinaria 0.8–0.95 mm long, 0.45–0.5 mm wide; pollinia erect, oblong, pellucid on outer margin, 0.6–0.7 mm long, 0.22–0.25 mm wide; corpusculum oblong, 0.22–0.3 mm long, 0.15–0.16 mm wide; caudicles winged, 0.18–0.2 mm long, 0.07–0.1 mm wide. Follicle fusiform, 8–15 cm long, 7–12 mm diameter. Seed 6–7 mm long, 3–4 mm wide; coma white, 20–25 mm long. **Fig. 4.**

Selected Specimens (21/55). **Papua New Guinea:** MADANG DISTRICT: Miak, Kar Kar Is., 4°40′S, 146°00′E, Aug 1968, *Millar* NGF37696 (BRI; CANB,L,LAE *n.v.*). MOROBE DISTRICT: Valley behind Oregenang Village, *Winters & Higgens* (USDA354239) IML75 (BRI*); Oomsis L.A., 20 miles [33.3 km] from Lae, 6°40′S, 146°45′E, Apr 1963, *Womersley* NGF17619 (BRI; LAE *n.v.*). WEST NEW BRITAIN: 2 miles [3.3 km] W of Lindenhafen Plantation, 6°20′S, 150°20′E, Feb 1971, *Stevens* LAE51138 (BRI; CANB,L,LAE *n.v.*). WESTERN HIGHLANDS DISTRICT: Mt Kum, 19 km S of Mt Hagen, *Winters & Higgens* (USDA354243), IML86 (BRI*). CENTRAL DISTRICT: Itikinumu Hill near Sirunumu Village, Ogotama, *Winters & Higgens* (USDA354246), IML76 (BRI*). MILNE BAY DISTRICT: Fife Bay, *Turner* [AQ217201] (BRI). **Solomon Islands.** Vanikoro, Santa Cruz Group, May 1928, *Kajewski* 546 (BRI; A *n.v.*). **Australia. Queensland.** COOK DISTRICT: Table Range, Dead Horse Ck, 12°55′S, 143°15′E, Oct 1973, *Dockrill* 780 (QRS); T.R. 14 (Leo Ck road, McIlwraith Range), 13°45′S, 143°20′E, Sep 1975, *Hyland* 8396 (BRI,QRS); Chester River, *Liddle* IML363 (BRI*); Bloomfield near Gap Ck, Oct 1981, *Scarth-Johnson* 1200A (BRI); T.R. 176, Shipton L.A., 15°48′S, 145°14′E, Sep 1982, *Hyland* 12052 (QRS); Coopers Ck, 16°10′S, 145°24′E, *Liddle* IML19 (BRI*); Davies Ck, *Liddle* IML42 (BRI*); Topaz, *Liddle* IML365* (BRI); Nth Johnston, *Liddle* IML41 (BRI*); S.F.R. 675, East Mulgrave L.A., 17°05′S, 145°40′E, Nov 1977, *Gray* 777 (QRS); O'Donoghue's cane farm, Mossman (Saltwater Ck), 1982, *Williams* 82164 (BRI). NORTH KENNEDY DISTRICT: N.P.R. 253, Mt Elliot, 19°30′S, 147°00′E, Dec 1977, *Hyland* 9571 (QRS); NW branch of Dryander Ck, Mt Dryander, Apr 1982, *Puttock & Wilson* [UNSW13284] (MEL).

Distribution and habitat: Widespread in the wet tropics of north Queensland and over a wide area of Papua New Guinea (**Map 3**). Plants are usually epiphytic or lithophytic and grow in a wide range of rainforest types from sealevel to over 1000 m.

Notes: Burton (1983) considered that *H. nicholsoniae* is synonymous with *H. pottsii* Traill described from the Philippines, however until a range of material from the Philippines can be examined to confirm this, we have not followed this synonymy. *H. nicholsoniae* is very variable both in leaf size and shape and the colour of the corolla and corona. Hill (1988) describes the pedicels of this species as being 6–10 cm long; this is incorrect. He also considered that *Liddle* IML39 (illustrated by Liddle 1986) from Flaggy Ck, Kuranda (incorrectly cited as IML36) possibly represented an additional taxon related to *H. nicholsoniae*. This particular clone is well within the range of variation for the species and differs only in the rounded outer coronal lobes edges.

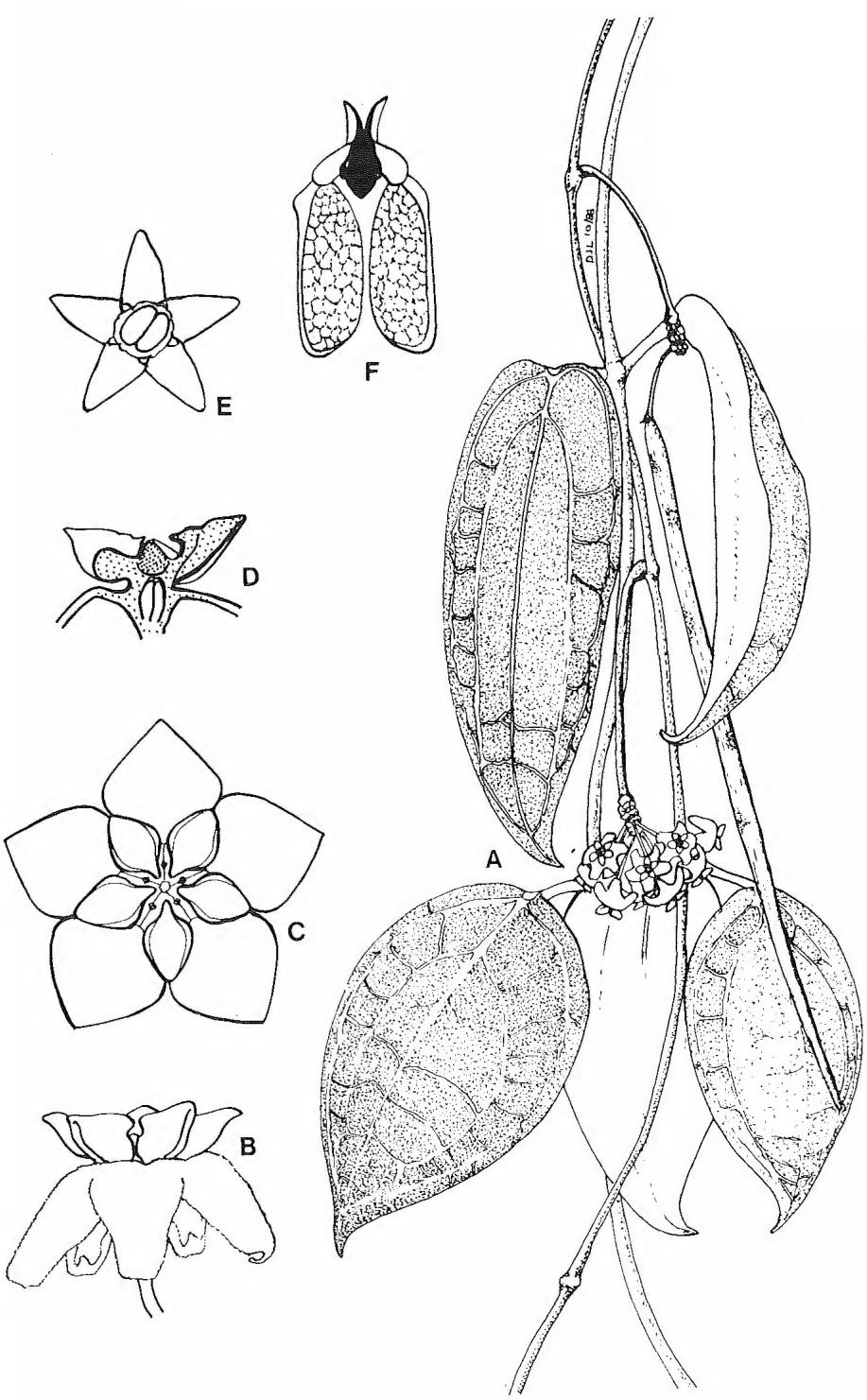

Fig. 4. *Hoya nicholsoniae*: A. habit of flowering and fruiting plant × 0.5. B. lateral view of flower × 2.5. C. apical view of flower × 2.5. D. lateral view of T.S. of staminal column and staminal corona × 2.5. E. apical view of calyx and ovaries, showing glands × 4. F. pollinarium × 28. All from live material of Liddle IML41.

Conservation status: Not endangered, rare or threatened at this stage.

4. Hoya litoralis Schltr. in Schumann & Lauterb., Nachträge Fl. Schutzgeb. Südsee 363 (1905). **Type:** Nordöstl. Neu-Guinea: auf Baumen am Strande von Potsdam-Hafen, 16 October 1901, *Schlechter* 13675 (holo: B (photo!)).
Schltr., Bot. Jahrb. Syst. 50: 108 (1914); Asclep. German New Guinea III. Hoya R. Br. (Engl. transl.) 4 (1981).

Perennial epiphytic vine, with white latex. Stems weakly twining to prostrate, up to 4 mm diameter and with a fine indumentum; internodes variable in length to 11 cm. Leaves petiolate; lamina ovate to broadly lanceolate, succulent, 3–10 cm long, 1.5–3 cm wide, tip acute, base cuneate to rounded, midrib faintly apparent on lower surface, secondary venation obscure, both surfaces with fine indumentum; petiole cylindrical, curved, 6–15 mm long, 1.5 mm diameter; extrafloral nectaries 3 at base of lamina. Inflorescence pseudomonochasial and geotropic, with up to 20 flowers; peduncle up to 7 cm long, 1–2 mm diameter, purple-brown, with fine indumentum. Flower scented, c. 6 mm long, 7–8 mm diameter; pedicels 2–3 cm long, c. 1 mm diameter, mainly glabrous but with an occasional hair, cream with a pink tinge. Sepals acute, c. 1 mm long and 1 mm wide, pale pink, with fine indumentum externally, glands at base absent. Corolla rotate; lobes ovate, pale pink, c. 4 mm long and 4 mm wide, strongly reflexed, upper surface completely covered with a dense covering of uniseriate hairs to 0.5 mm long giving a silver appearance, under surface glabrous. Staminal corona c. 2.5 mm long, 5–7 mm diameter, inserted on the upper 2–2.5 mm of staminal column, light pink; lobes c. 3 mm long and 1 mm wide, top end extended into a subulate tip over the style-head, bottom end with 2 extensions each c. 1 mm long and 0.5 mm wide. Staminal column 2–2.5 mm long, c. 1 mm diameter. Slit between anther wings c. 0.75 mm long. Anther membranes ovate, c. 1 mm long and 0.75 mm wide. Style-head not exceeding anthers, c. 1.5 mm wide. Ovaries glabrous, c. 2 mm long and 2 mm wide. Pollinaria c. 0.6 mm long and 0.5 mm wide; pollinia oblong, outer edge with a pellucid margin, c. 0.4 mm long and 0.17 mm wide; corpusculum oblong, c. 0.15 mm long and 0.1 mm wide; caudicles winged, c. 0.16 mm long and 0.13 mm wide. Follicles and seed not seen. **Fig. 5.**

Specimens examined. Papua New Guinea. WEST SEPIK DISTRICT: Selio Is., 3°10′S, 142°30′E, May 1969, *Millar & Vandenberg* NGF40879 (BRI; CANB,L,LAE *n.v.*). EAST SEPIK DISTRICT: Cape Wom International Park, c. 8 km NW of Wewak town, 3°35′S, 143°35′E, Nov 1976, *Wiakabu & Yefle* LAE70316 (BRI; CANB,L,LAE *n.v.*). WESTERN DISTRICT: Along Tiyangaram (Black River) S of Ambunti, Jun 1966, *Hoogland & Craven* 10280 (BRI; A,CANB,K,L,LAE *n.v.*); ditto, Jun 1966, *Hoogland & Craven* 10337 (BRI; A,CANB,K,L,LAE,US *n.v.*); Lake Daviumbu, Middle Fly River, Aug 1936, *Brass* 7626 (BRI; A *n.v.*). **Australia. Queensland.** COOK DISTRICT: Mt Augustus, Moa Is, 10°09′S, 142°18′E, Nov 1986, *Hardy* IML708 (BRI*); ditto, Feb 1989, *Clarkson* 7767 (BRI*); Moa Peak, Moa Is, Feb 1989, *Clarkson* 7760 (BRI*); Pennefather River, Feb 1987, *Taplin* 223 (BRI).

Distribution and habitat: Recorded from among littoral vegetation from around the coastline of Papua New Guinea, and from two localities in Australia (**Map 2**).

Notes: *H. litoralis* was allied by Schlechter (1905) to *H. gracilis* Schltr. and further collections are required from Papua New Guinea to determine whether or not there is continuous variation between these forms.

Conservation status: *H. litoralis* has been collected in a number of coastal localities in Papua New Guinea, but is rare in Australia. Rating 3R (cf. Briggs & Leigh 1988).

5. Hoya pseudolittoralis Norman, Brittonia 2: 328 (1937). **Type:** Papua New Guinea. WESTERN DISTRICT: Dagwa, Oriomo River, Feb-March 1934, *L.J. Brass* 5990 (holo: BM (photo!); iso: A (photo!), BRI).
Burton, Hoyan 7: 6 (1985).

Hoya alata K. Hill, Telopea 3: 249 (1988), **synon. nov. Type:** Pascoe River rockpile, *B. Wallace* 83250 (holo: NSW *n.v.*; iso: BRI(not received),K,L *n.v.*).

Hoya sp., Jones & Gray, Austral. Climbing Pl. Fig. 126 (1977); Climbing Pl. Austral. (1988).

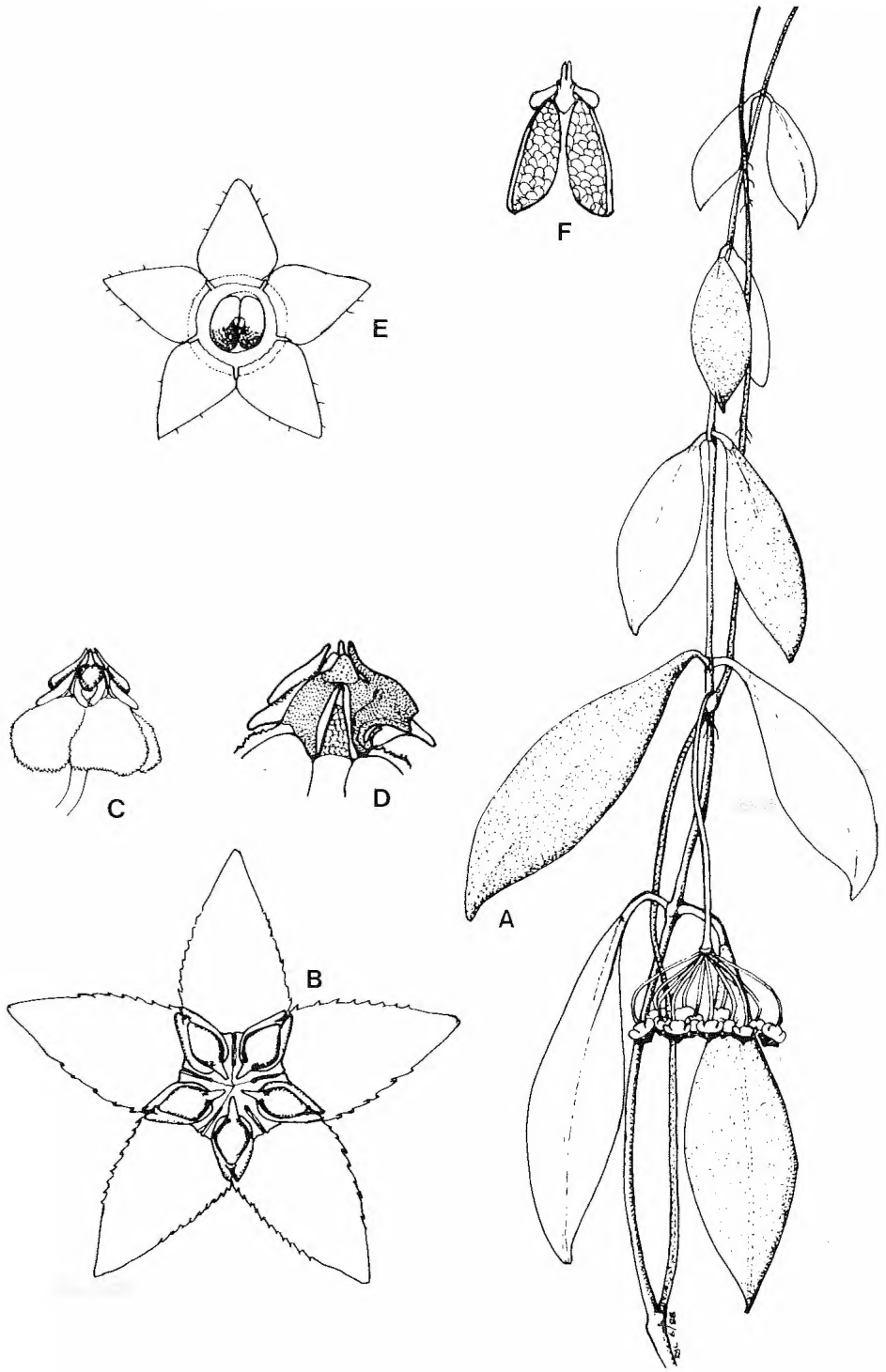

Fig. 5. *Hoya litoralis*: A. habit of flowering plant × 0.5. B. apical view of flower × 4. C. lateral view of flower × 2.5. D. lateral view of T.S. of staminal column and staminal corona × 4. E. apical view of calyx and ovaries × 8. F. pollinarium × 30. All from live material of Hardy IML708.

[*Hoya poolei* auct. non C. White; D. Liddle, Hoya in Australia 13, 15, Fig. 14 (1986)]

[*Hoya gracilipes* auct. non Schltr.; Jones & Gray, Climbing Pl. Austral. 242 (1988); *Thomas & McDonald*, Rare and Threatened Plants of Queensland 18 (1989)]

Perennial epiphytic or lithophytic vine, with white latex. Stems twining, cylindrical, to 5 mm diameter, glabrous or with an occasional scattered hair; internodes variable in length to 7 cm. Leaves petiolate; lamina fleshy, ovate, obovate, or rhomboid, 3–9.5 cm long, 2–5 cm wide, tip acute, base cordate, venation obscure, sub-parallel or palmate, pale green to pink or bronze in strong light; petioles 2–12 mm long, 2–4 mm diameter, glabrous; extrafloral nectaries 4 comprising 2 fused and 2 minor ones at the base of the lamina. Inflorescence pseudomonochasial with up to 12 flowers; peduncle up to 8.5 cm long, c. 2 mm diameter, geotropic, glabrous. Flowers 3–4 mm long and 12–13 mm diameter; pedicels glabrous or with an occasional scattered hair, 16–18 mm long, 1 mm diameter. Sepals ovate to triangular, glabrous, 0.75–1.5 mm long, 0.75–1 mm wide, with generally 1 gland at base. Corolla rotate, lobes recurved, triangular, 4–5 mm long, c. 5 mm wide, pilose on the upper surface, pale pink to almost white. Staminal corona inserted on top 2 mm of staminal column, c. 2 mm long, 6–7 mm diameter; lobes oblong-linear, 3 mm long, 1–1.5 mm wide. Staminal column 2–2.5 mm long, c. 2 mm diameter. Anther membranes acute, c. 0.5 mm long and 0.5 mm wide. Slit between anther wings c. 1 mm long. Style-head not exceeding anthers, c. 1 mm diameter. Pollinaria 0.55–0.6 mm long, c. 0.3 mm wide; pollinia erect, oblong, outer edge pellucid, 0.35–0.4 mm long, c. 0.15 mm wide; corpusculum oblong, tan, 0.13–0.14 mm long, 0.06–0.1 mm wide; caudicles winged for entire length, 0.1–0.13 mm long, 0.1–0.13 mm wide. Follicle fusiform, 7–14 cm long, 0.7–1.2 cm diameter. Seed not seen. **Fig. 6.**

Specimens examined. Papua New Guinea. BOUGAINVILLE: Arawa Plantation, 6°15′S, 155°40′E, Apr 1970, *Millar & Vandenberg* NGF48510 (BRI; L,LAE *n.v.*). CENTRAL DISTRICT: Sirinumu Dam, Sep 1971, *Millar & Womersley* 1277 (MEL; UPNG *n.v.*); Itikinumu Hill, near Sirunumu Village, Ogotama, *Winters & Higgens* (USDA354247), IML80 (BRI*). WESTERN DISTRICT: Lower Fly River, east bank opposite Sturt Island, Oct 1936, *Brass* 8072 (BRI; A *n.v.*). **Australia. Queensland.** COOK DISTRICT: Claudie river, 12°45′S, 143°20′E, Oct 1973, *Dockrill* 786 (QRS); ditto, Oct 1986, *Gray* 4371 (QRS); ditto, Oct 1980, *Hyland* 10814 (QRS); Tozers Gap, 12°44′S, 143°13′E, Sep 1976, *Gray* IML24 (BRI*).

Distribution and habitat: Restricted to the Mt Tozer and Iron Range area of north Queensland, and from a few scattered localities in Papua New Guinea (**Map 4**). Plants occur as epiphytes or lithophytes in rainforest, usually among rocks.

Notes: *H. pseudolittoralis* is closely allied to *H. eitapensis* Schltr. and *H. microstemma* Schltr. and further studies of variation in this group may show all to be part of one variable taxon. Hill (1988) named the Australian material '*alata*' in the belief that it is the only taxon in Australia with winged caudicles. Both *H. litoralis* and *H. nicholsoniae* also have winged caudicles, although they are sparingly so in the latter species. In *H. lauterbachii*, the caudicles are winged for part of their length. The material of *H. pseudolittoralis* from Papua New Guinea shows virtually no morphological differences from the Australian material (Liddle 1986) and collections have been in general cultivation since the early 1970's, so Hill's contention that the Australian material is endemic is without foundation. The isotype of *H. pseudolittoralis* at BRI is a particularly good match for well grown specimens of the Australian populations.

Conservation Status: Rating 3RC: Iron Range (Briggs & Leigh 1988).

*7. **Hoya serpens** J.D. Hook., Fl. Brit. India 4: 55 (1883). **Type**: Sikkim, Himalaya, *Griffith* (holo: K *n.v.*).

Perennial epiphytic vine with white latex. Stems twining, up to 1 mm diameter, rooting at nodes, cylindrical, with sparse indumentum; internodes up to 3 cm long. Leaves petiolate; lamina suborbicular, papillose on both surfaces, up to 15 mm long and 12 mm wide, green to matt-grey in colour above, paler below, with isolated to sparse indumentum on both surfaces, secondary venation obscure; petiole cylindrical, up to 4 mm long and 1 mm wide; extrafloral nectaries absent from lamina base. Inflorescence geotropic, with up to 8 flowers; peduncle 28–35 mm long, c. 1 mm diameter, with sparse indumentum. Flowers 15–16 mm diameter; pedicels 19–20 mm long, c. 1 mm diameter, glabrous or with isolated hairs. Sepals ovate, 1.4–1.5 mm long and c. 1.5 mm wide, with

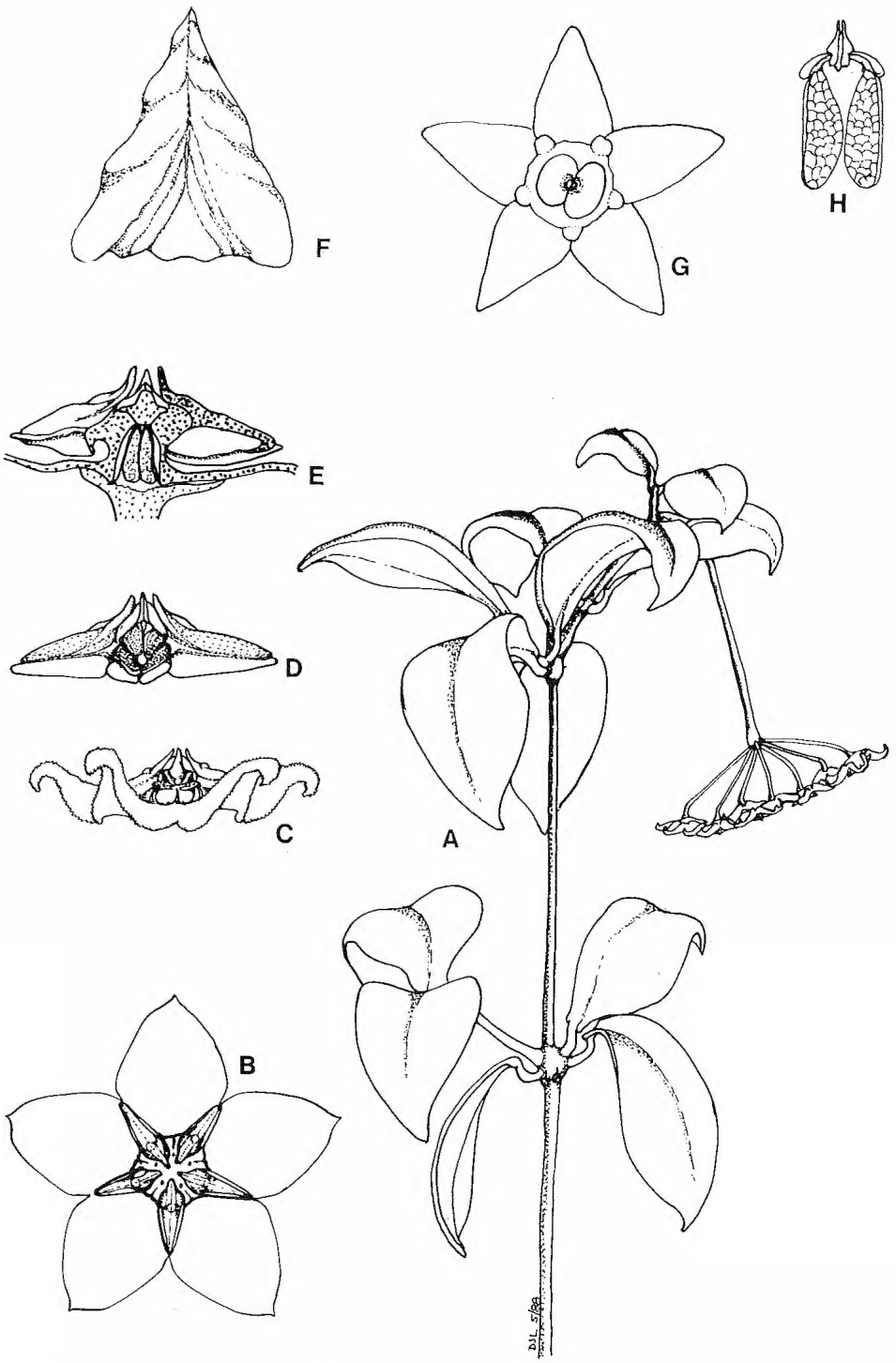

Fig. 6. *Hoya pseudolittoralis*: A. habit of flowering plant × 0.5. B. apical view of flower × 2.5. C. lateral view of flower × 2.5. D. lateral view of staminal column and staminal corona × 4. E. lateral view of T.S. of staminal column and staminal corona × 4. F. anther appendage × 27. G. apical view of calyx and ovaries, showing glands × 4. H. pollinarium × 27. All from live material of Gray IML24.

sparse indumentum externally and 1 gland at each sinus base. Corolla campanulate, white; lobes acute, c. 5 mm long and 5 mm wide, edges recurved, upper surface with dense indumentum of white hairs, under surface glabrous. Staminal corona c. 3 mm long and 7 mm diameter, inserted for entire length of staminal column, white; lobes ellipsoid, ends incurved, 3.3–3.5 mm long and c. 2 mm wide. Staminal column c. 1.5 mm long and 2 mm diameter. Anther membranes triangular, c. 0.5 mm long and 0.5 mm wide. Slit between anther wings 1–1.1 mm long. Style-head not exceeding anthers, c. 1 mm diameter. Ovaries glabrous, c. 1.6 mm long and 1.5 mm wide. Pollinaria c. 0.9 mm long and 0.6 mm wide; pollinia c. 0.7 mm long and 0.26 mm wide, with a pellucid margin; corpuscle 0.34–0.35 mm long, c. 0.16 mm wide, tan; caudicles 0.17–0.18 mm long, c. 0.07 mm wide, slightly winged at pollinium end. Follicles and seed not seen.

Specimens examined. Queensland. COOK DISTRICT: cultivated ex Lamond Hill, Iron Range, Oct 1985, *Sankowsky & Sankowsky* 473 (BRI*); ditto, Jul 1989, *Sankowsky & Sankowsky* IML274 (BRI).

Distribution and habitat: Recorded only from Lamond Hill where the plants grow as epiphytes in secondary rainforest (G. Sankowsky, pers. comm. 1989).

Notes: The record of this species from Lamond Hill is intriguing as the species is described from the Indian subcontinent. There are many other naturalised plants at Lamond Hill, e.g. *Caladium* × *hortulanum*, *Pedilanthus tithymaloides*, *Sansevieria trifasciata* and *Mangifera indica*, all undoubtedly persisting from the time of the gold-field that was present some 90–100 years ago. As *H. serpens* has not been recorded elsewhere in Australia, New Guinea or south-east Asia, it is considered to be naturalised.

Excluded Species

1. **Hoya barbata** (R. Br.) Sprengel, Syst. veg. 1: 843 (1820), based on *Tylophora barbata* R. Br., Prodr. 460 (1810). This is *T. barbata.*

2. **Hoya flexuosa** (R. Br.) Sprengel, Syst. veg. 1: 843 (1820), based on *Tylophora flexuosa* R. Br., Prodr. 460 (1810). This is *T. flexuosa.*

3. **Hoya grandiflora** (R. Br.) Sprengel, Syst. veg. 1: 843 (1820), based on *Tylophora grandiflora* R. Br., Prodr. 460 (1810). This is *T. grandiflora.*

4. **Hoya paniculata** (R. Br.) Sprengel, Syst. veg. 1: 843 (1820), based on *Tylophora paniculata* R. Br., Prodr. 460 (1810). This is *T. paniculata.*

Acknowledgements

A large number of people and some institutions have aided in the collection or provision of live material and we would like to thank Australian National Botanic Gardens, Canberra; P.D. Bostock, J.R. Clarkson; R. Collins; D.M. Cumming; B. Ghen; B. Gray (QRS); G. Hardy; R.A. Harvey; M. Hodge,; B.P.M. Hyland (QRS); G. Kenning; P.S. Lavarack; R. Lockyer; M.F. Olsen; Mount Coot-tha Botanic Gardens; V. Scarth-Johnson; M.C. Tucker; and the various landholders from whose property plants were obtained. C.M. Burton and D. Kloppenberg provided various photographs of types. K.L. Wilson (NSW), while Australian Botanical Liasion Officer at Kew, provided a photo of the holotype of *H. pseudolittoralis.* P.D. Bostock commented on the manuscript. L. Pedley (BRI) arranged the loan of material. K. Kerenga (LAE) provided information on localities for several collections. The Directors of BM, BRI, CANB, DNA, JCT, MEL, QRS and PERTH provided access to material, either on loan or at their institutions. The Queensland National Parks and Wildlife Service and the Queensland Department of Forestry provided various permits to collect material in areas under their jurisdiction. The Australian Biological Resources Study provided funding to PIF in 1988 and 1989. We gratefully acknowledge this assistance.

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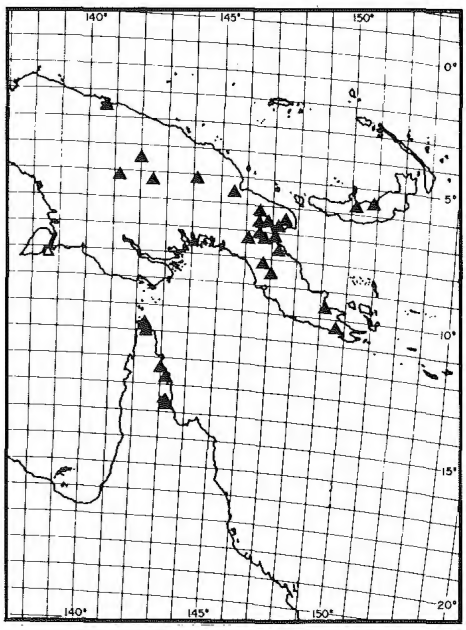

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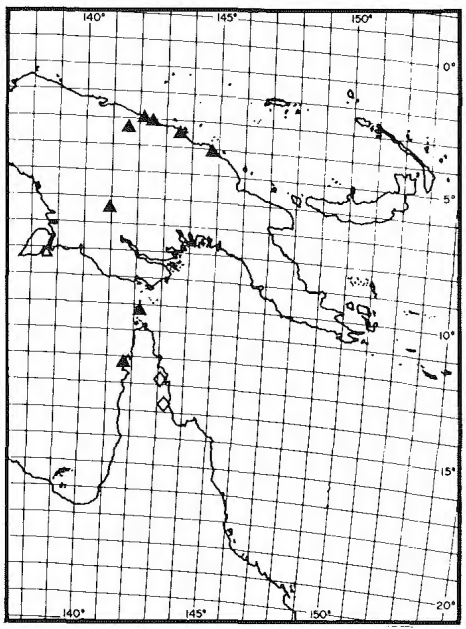

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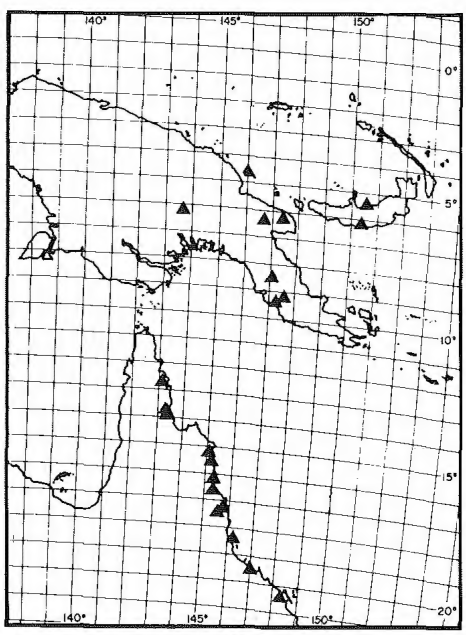

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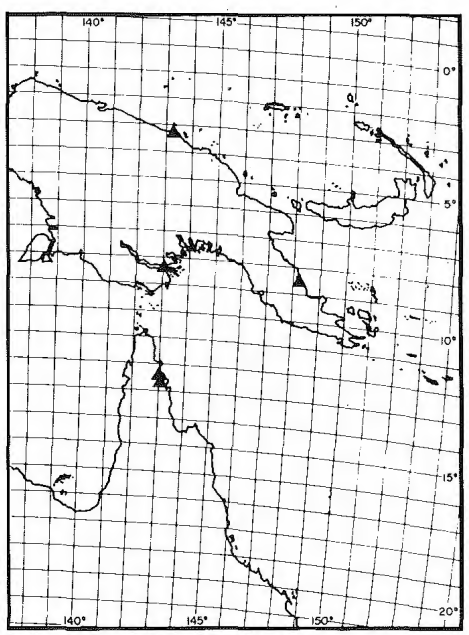

4

Maps 1–4. Distribution within Australia and New Guinea of *Hoya* spp.: 1. *H. lauterbachii*. 2. ▲ *Hoya litoralis*, ◇ *H. macgillivrayi*. 3. *H. nicholsoniae*. 4. *H. pseudolittoralis*.

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Index to Numbered Collections

The number following the colon is the number of the species in the taxonomic section above.

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Accepted for publication 8 February 1990

Austrobaileya 3(2): 235–238 (1990)

TWO NEW SPECIES AND A NEW NAME IN *COMMELINA* L. (COMMELINACEAE) IN AUSTRALIA

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Summary

***C. reticulata* and *C. tricarinata* are described as new and illustrated. *C. reticulata* is from the western Kimberley region of Western Australia. *C. tricarinata* is from the Barkly Tableland area of the Northern Territory and western Queensland. *C. ciliata* is a new name for *C. acuminata* Ewart & McLennan non Poiret. *C. ciliata* is also illustrated.**

In the course of studies on *Commelina* L. it became apparent that two undescribed species belonging to this genus occur in Australia. One species occurs in the Camden Sound – Calder River area of the Kimberley region in Western Australia. The other is widespread in Western Queensland and the Barkly Tableland area of the Northern Territory. Study also revealed that *C. acuminata* Ewart & McLennan is illegitimate, being a later homonym of *C. acuminata* Poiret.

This paper is a precursor of a revision of the genus *Commelina* L. in Australia and was written to validate the names given here and hence allow use of the names. A complete discussion of the relationships of all the Australian species, including a discussion of subgenera, will be included in the forthcoming revision.

Commelina reticulata Stanley, **sp. nov.**, *C. agrostophyllae* F. Muell. primo aspectu maxime simili, sed testa seminum reticulata differt. **Typus**: Western Australia: Camden Sound, 18 May 1921, *C.A. Gardner* 1344 (holo: PERTH).

Caules repentes. Folia linearia vel lineari-lanceolata, acuta, 3–7.5 cm longa et 1–2 mm lata. Spatha singularia, 1–3 cm longa et 2.5–3.5 mm lata, marginibus plerumque fimbriatis; cymae 2, cyma superior flore 1 praedito, cyma inferior floribus 2 vel 3 praeditis. Flores caerulei. Ovarium 2-loculare. Capsula ovoidea, c. 6 mm longa. Semina ovoidea, c. 2.5 mm longa, testa reticulata.

Perennial (?) with prostrate stems. Leaves linear or linear-lanceolate, 3–7.5 cm long, 1–2 mm wide, apex acute. Spathes borne singly in leaf axils, 1–3 cm long, 2.5–3.5 mm wide, with long apical acumen and free margins, the margins of the broadest portion of the spathe with a sparse fringe of tubercle-based multicellular hairs up to 3 mm long, sometimes only 1 or 2 hairs present or some spathes with no marginal hairs, inner surfaces of spathes ± glabrous; peduncles 1.5–6.5 cm long. Cymes 2 per spathe, upper cyme 1-flowered, the flower male or sometimes bisexual, lower cyme 2- or 3-flowered. Flowers blue, c. 2 cm across. Calyx segments with sparse minute hooked hairs outside. Stamens 3, staminodes 3. Ovary apparently 2-locular, with 2 ovules in each locule. Capsules developing outside spathe, ovoid, c. 6 mm long. Seeds ± ovoid, c. 2.5 mm long; seed coat with coarse raised reticulate venation. **Fig. 1A–C.**

Specimens examined: Western Australia. Camden Sound, May 1921, *Gardner* 1344 (PERTH); Port George IV, Camden Sound, May 1921, *Gardner* 844 (PERTH); 2 km SW of Base Camp near Munja on Calder River, May 1983, *Edinger* 5 (PERTH); 1 km north of Calder River, May 1983, *Edinger* 50 (PERTH).

Distribution and habitat: It is known only from the vicinity of Camden Sound and Calder River in the western Kimberley region of Western Australia. Only two of the specimens seen had habitat information on associated labels. Both were collected on damp to wet soils on an alluvial floodplain.

Affinities: Vegetatively the species closely resembles *C. agrostophylla* F. Muell. but is easily distinguished from that species by its reticulate veined seed coat, whereas *C. agrostophylla* has a smooth seed coat. *C. tricarinata* Stanley also has reticulately veined seed coats but on vegetative characters does not appear to be closely related to *C. reticulata.*

Conservation status: The species is poorly known and has a restricted distribution. It has a Conservation status of 2K by the criteria of Briggs and Leigh (1988).

Etymology: The specific epithet refers to the raised reticulate venation on the seed coat.

Note: The two specimens collected by C.A. Gardner from Camden Sound on 18 May 1921 may be part of the same collection. The specimen I have designated holotype has a handwritten label from the "Herbarium of the Forests Department" and the collection number 1344. The other specimen is part of the Herbarium Gardnerianum and has a typewritten label with the collection number 844 and the additional information "Port George IV". Because of the similarity of the numbers it may be that a transcription error occurred when the labels were being prepared. If that is the case then the sheet Gardner 844 would be an isotype.

Commelina tricarinata Stanley, **sp. nov.** affinis *C. reticulatae* Stanley sed spatha 2.5–4.5 cm longa et 0.9–1.5 cm lata et tricarinata differt. **Typus:** Northern Territory: 3 miles [4.8 km] W Crows Nest bore, Burnett Downs, 23 March 1956, *G. Chippendale* 1952 (holo: NT; iso: AD,BRI,CANB,MEL,NSW).

Planta perennis. Caules repentes vel ascendentes. Folia lanceolata vel interdum ovata, acuta vel acuminata, 3–12 cm longa et 0.8–1.6 cm lata. Spatha singularis, 2.5–4.5 cm longa et 0.9–1.5 cm lata, tricarinata; carinae conspicuuae; cymae 2, cyma superior floribus 1 vel 2 praeditis, cyma inferior floribus 3 praeditis. Flores caerulei. Ovarium 3-loculare. Capsula ovoidea-globosa, 7–9 mm longa, loculus dorsalis indehiscens, loculi ventrali dehiscenti. Semina globosa, c. 3 mm diametro, testa venationibus reticulatibus.

Plants with perennial rootstock and short lived above-ground parts. Stems prostrate or ascending, usually less than 50 cm tall, often less than 20 cm tall. Leaves lanceolate or occasionally ovate, 3–12 cm long, 0.8–1.6 cm wide, glabrous; apex acute to ± acuminate. Spathes borne singly in the leaf axils, 2.5–4.5 cm long, 0.9–1.5 cm wide; tip acuminate, keeled along fold; sides with a conspicuous keel c. 1/3 of distance from the base to the top; margins free at base and with minute cilia; peduncles up to c. 5 cm long. Cymes 2 per spathe; upper cyme 1- or 2-flowered, the flowers apparently male; lower cyme 3-flowered, the flowers bisexual. Flowers blue, c. 2 cm across. Calyx segments with sparse minute hooked hairs along central part or glabrous. Stamens 3; staminodes 3. Ovary with 2 ovules in each ventral locule, dorsal locule with 1 ovule. Capsules 7–9 mm long; ventral locules dehiscent, dorsal locule usually developed, indehiscent. Seed ± globular, c. 3 mm diameter; seed coat with conspicuous raised reticulate venation. **Fig. 1D & E.**

Specimens examined: Northern Territory. 10 miles [16 km] NW of Rankin River, Jun 1947, *Perry* s.n. (CANB); Brunchilly Station, Attack Creek, Mar 1966, *McEvey* 45 (MEL,NT); 3 km north of No. 8 Bore, Brunchilly Station, Jun 1984, *Low* 129 (NT); 3 miles [4.8 km] SE Rockhampton Downs H.S., Mar 1959, *Chippendale* 5399 (NSW,NT); 3 miles [4.8 km] W Crows Nest bore, Burnett Downs, Mar 1952, *Chippendale* 1952 (AD,BRI,CANB,MEL,NSW,NT); **Queensland.** BURKE DISTRICT: 60 miles [96 km] north of Julia Creek on Julia Creek – Normanton road, Mar 1977, *Schmid* AS 121 (BRI); 60 miles [96 km] NW of Maxwelton on "Sutherland", Mar 1964, *Entwistle* 16 (BRI); Hughenden, May 1933, *McCarthy* 45/33 (BRI). GREGORY NORTH DISTRICT: Elderslie, Oct 1935, *Blake* 10013 (BRI); Georgina R., 3 miles [4.8 km] E Glenormiston H.S., Jan 1970, *Latz* 538 (BRI,NT); Georgina River crossing, Jan 1970, *Robinson* 1 (NT); Eyre Creek, 35 miles [56 km] S of Bedourie, Jul 1936, *Blake* 12293 (BRI). GREGORY SOUTH DISTRICT: Nocatunga, *Morris* 1082 (BRI). WARREGO DISTRICT: 46 km from Cunnamulla along road to Barringun, Mar 1976, *Purdie* 282 & *Boyland* (BRI).

Distribution and habitat: The species is endemic in the Barkly Tableland area of the Northern Territory and in arid areas of western Queensland. The species is usually found in grey or black cracking clay soils in or around areas subject to inundation after rains.

Affinities: The species does not appear to be particularly closely related to any of the other species of *Commelina* in Australia. On seed characters its closest Australian relative is *C. reticulata* Stanley but is easily distinguished from it on vegetative characters, notably its 3-keeled spathe and broader leaves.

Conservation status: This species is widely distributed and although it is not known to occur in any reserves it does not appear to be threatened.

Etymology: The specific epithet is derived from *tri* (three) and *carina* (keel).

Notes: Field observations in western Queensland suggest that the rootstock lies dormant in the soil until after rain, when the plant quickly produces shoots, flowers and fruits. The plants are apparently able to grow to flower and fruit after rainfall from a single

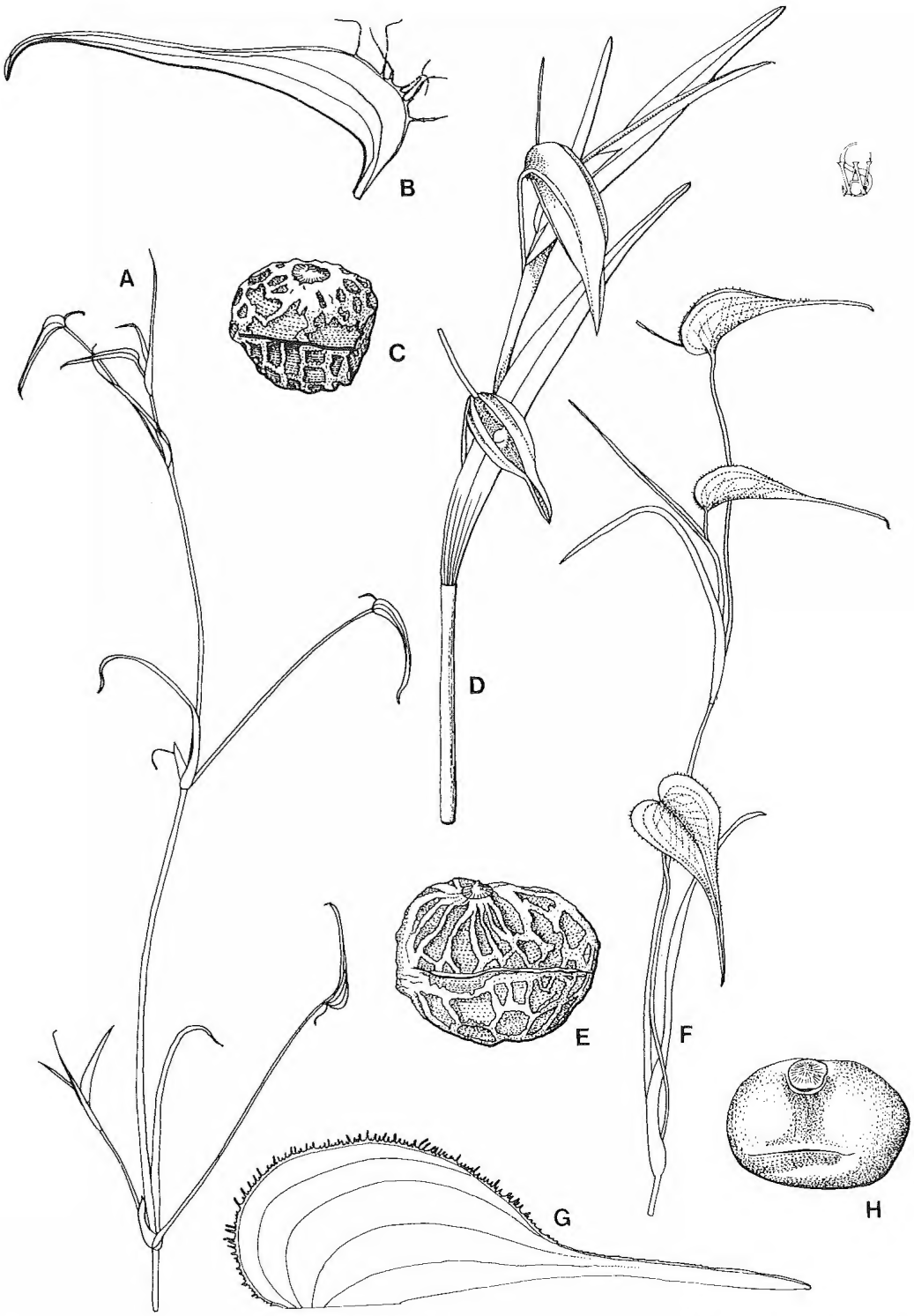

Fig. 1. *Commelina reticulata*: A. portion of stem with spathes × 0.67. B. spathe × 3. C. seed × 8. *Commelina tricarinata*: D. portion of stem with spathes × 0.67. E. seed × 8. *Commelina ciliata*. F. portion of stem with spathes × 0.67. G. spathe × 3. H. seed × 8.

storm and before the soil dries out. Also, the species is probably more common than herbarium records indicate.

Commelina ciliata Stanley, **nom. nov.**

Commelina acuminata Ewart & McLennan in Ewart & Davis, Fl. N. Territory, 68–69 (1917), *nom. illeg.*; non *Commelina acuminata* Poiret, Encycl. Suppl. ii: 324 (1811). **Type:** near Red Lily Lagoon, 6 April 1912, *G.F. Hill* 833 (lecto (designated here): MEL; isolecto: NSW). **Fig. 1F–H.**

Note: Ewart and McLennan did not cite a holotype with the original description. The sheet here chosen as lectotype has the collector number 833 which is the number cited with the original description. However the sheet here designated isolectotype has the collector number 1833 but all other label details are identical with those on the lectotype sheet. The lectotype label has the number enclosed in brackets but the left hand bracket could be mistaken for the figure one. It appears that a transcription error occurred when the label for the isolectotype was being prepared.

Reference

BRIGGS, J.D. & LEIGH, J.H. (1988). Rare or Threatened Australian Plants. 1988 Revised Edition. Australian National Parks and Wildlife Service Special Publication No. 14. Canberra: Australian National Parks and Wildlife Service.

Accepted for publication 30 January 1990

Austrobaileya 3(2): 239–260 (1990)

GONDWANAN GRASSES IN THE AUSTRALIAN FLORA*

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Summary

All the currently recognized major groups of the Poaceae (the grass family) with the exception of the pooids, are postulated to have had a Gondwanan origin. There is no hard evidence for this belief, the fossil record of the family being extremely poor and giving little assistance in the study of the palaeogeography and evolution of taxa. The evolution of the major groups, and in some cases genera and species of grasses, is reviewed in relation to Gondwanic events, both generally and in relation to Australia, in the light of studies from biogeography, plate tectonics, numerical methods and cytogeography.

Introduction

Due to their economic importance the grass family has probably been researched more intensively, from many different angles, than any other plant family. Accurate distributional data are available from the many accounts of the family that exist for most regions of the world and from these data a number of biogeographical analyses at global or regional levels has been undertaken at various ranks. Examples are the papers of Hartley (1950, 1958a, 1958b, 1973) and Hartley and Slater (1960) for tribes and subfamilies; the chorological studies of Clayton (1975), Clayton and Cope (1980a, 1980b) and Cross (1980); the biogeographical work of Clifford and Simon (1981) and Simon (1981, 1986, 1988); and the distributional studies of Australian (Hattersley 1983; Prendergast & Hattersley 1985; Prendergast *et al.* 1986; Prendergast 1989) and southern African taxa (Ellis 1977; Ellis *et al.* 1980; Gibbs Russell 1986; Vogel *et al.* 1978) in connection with the distribution of taxa with reference to their decarboxylation types. Despite all this work however, knowledge pertaining to the origins and evolution of major groups (used here as more or less equivalent to subfamilies, see **Table 2**), genera and species of grasses remains in the realm of speculation mainly due to their very poor fossil record. Grasses are found in all regions of the world inhabited by plants and although all except the pooids are thought to have had a Gondwanan origin (Clayton 1981) (**Fig. 1**), this has been deduced by a study of their current biogeography in relation to their probable phylogeny rather than by their present day distribution being "Gondwanic" in the nature of that of the "southern" families Myrtaceae, Proteaceae and Restionaceae (Johnson & Briggs 1981). In addition to current distribution patterns of grasses we need to look to some other sources of evidence in attempting to target those major groups, genera and species we assume to be Gondwanan. Avenues open for investigation include **palaeobotany**, **tectonic history**, **numerical methods** and **cytogeography**.

Palaeobotany

The best fossil record is from the United States of America (Thomasson 1980, 1987) (**Table 1**) and even this is inadequate to help in understanding phylogeny. In Australia, older monosulcate pollen, characteristic of monocotyledons and a few dicotyledons, has been found from the early Aptian stage of the lower Cretaceous (125 m.y.B.P.) (Dettman 1981).

The first appearance of fossil grass pollen in Australia is in the early Eocene (54 m.y.B.P.) of the Tertiary period (Smith 1982), as is the case elsewhere in the world, but records become more common in the Pliocene (10 m.y.B.P.) (Martin 1981). None of

* Presented at the Australian Systematic Botany Society Forum on Gondwanan Elements in the Australian Flora, 30 June 1989.

the pollen is identifiable to genus. There are also Tertiary leaf fragments that have been assigned to the genus *Phragmites* and form genera *Bambucites* and *Poacites* (see Duigan 1951) but these records date back to the last century when palaeontological methods were very crude (Thomasson 1980).

Tectonic History

It is necessary to place the few existing Australian grass fossils in the context of the timing of the origin of the angiosperms and of the tectonic history of the region in relation to the fragmentation of Gondwanaland. An excellent essay of these events and the impact they had on the evolution of the Australian flora is that of Barlow (1981), although ideas on Gondwanaland reconstruction have been altered recently by the inclusion of many more areas of Asia (Audley-Charles 1987). Details from these papers, together with other papers dealing more specifically with the grasses (Clayton 1975, 1981; Clifford & Simon 1981; Hattersley 1983; Simon 1986, 1988), can be used to develop a plausible account of how subfamilies, genera and species of Gondwanan grasses evolved and were distributed, with particular reference to Australia.

A discussion of the age of the grasses has to commence with discussion of the origin and age of the angiosperms in general. Because the features of double fertilization and triploid endosperm are unique to the angiosperms it is generally assumed that they are monophyletic although a few views have been put suggesting that they could be polyphyletic (see references in Barlow 1981). Evidence exists that angiosperms had a Gondwana-wide distribution before the fragmentation of the supercontinent. Monosulcate pollen (indicative of monocotyledons and dicot Annonales and Nymphaeales) and tricolpate pollen, characteristic of all other dicotyledons, is known at several widespread localities in the lower Cretaceous (see **Table 1**). There are two main areas where the angiosperms are postulated to have originated, one in western Gondwanaland, possibly tropical Africa (Raven & Axelrod 1974) and the other being a zone from India to Fiji (Smith 1963; Takhtajan 1969) in eastern Gondwanaland. Although the latter region had fallen from favour (Schuster 1976) the recent paper by Audley-Charles (1987) has offered new evidence for regarding this region more favourably.

The grass family appears to have existed almost as long as the angiosperms (**Table 1**), although they are thought to have come on the scene after the angiosperms were well diversified (Gould & Shaw 1983). The fossils listed in the table give little clue as to when the major groups and genera of grasses diverged from each other, and which areas of Gondwanaland could be regarded as their cradle. In this respect they are no different from other Angiosperm families for which schemes have been given for the radiation of contemporary taxa, e.g. Proteaceae (Johnson & Briggs 1975, 1981).

Clayton (1981) (**Fig. 1**) suggested the Flagellariaceae or a similar group as an evolutionary precursor to the grasses. This hypothesis has been tested by recent cladistic studies (Campbell & Kellogg 1987; Kellogg & Campbell 1987) where the Flagellariaceae and Joinvilleaceae have both been used as outgroups. While their preliminary results to date do not seem to indicate either family as particularly appropriate, there do not seem to be any realistic alternatives. Clayton's placing of the major groups, both their position in relation to each other, to Gondwanan and non-Gondwanan areas, and to the type of carbon decarboxylation, looks plausible. The arundinoid group, for example, stands as fairly central in the scheme and is postulated to be the core group from which all non-bambusoid groups arose. A similar pattern was proposed 25 years earlier by Stebbins (1956) in his familiar amoeboid cross section of an evolutionary tree in which the hypothetical ancestor, indicated by a star, is believed to be related to the Flagellariaceae, Restionaceae or primitive Liliaceae. A contrary view (Tsvelev 1969) is that pooids are ancestral and this is supported by recent cladistic work (Kellogg & Campbell 1987).

Although the major groups (subfamilies or tribal groupings) and tribes of grasses are distributed in the world in broad latitudinal belts (Hartley 1950; Cross 1980; Simon 1988) more or less correlated with their physiological adaptations to different climates, two-thirds of the genera are restricted to one continent (Clayton 1975). From this it is deduced that the major groups were established before the breakup of Gondwanaland and a large proportion of the genera became differentiated after this event. An extension of Clayton's biogeographic analysis of genera based on the floristic regions of Tahktajan

Table 1. Geological time scale since the Jurassic, with accompanying tectonic activity, known grass fossils and major developments affecting grass evolution.

Age	Period	Epoch	Tectonic event	Grass fossils	Life
2.5	QUAT	Pleistocene		12 records (Afr, U.S.)	Widespread glaciation
	T	Pliocene		5 records (N&S Am, Eu)	
10			N.Am = S.Am		
	E	Miocene	Aust = Asia	Many grass fossils	
			Afr = Eurasia	(Europe, U.S.A.)	
20	R				
30					
	T	Oligocene	S.Am|Ant|Aust	10 grass fossils	Evolution of
			(end of temp.	(Colorado, Montana)	grazing
	I		link)		animals
40					
	A	Eocene	India=Asia	?*Poacites* (Argentina)	Most
				?*Bambusites*, ?*Poacites*	angiosperm
50	R			?*Phragmites* (Australia)	families exist
				Fossil grass pollen in Australia	
	Y				
60		Palaeocene			
	U		Eurasia|Afr		
	P				Numerous
	P		N.Z|Aust|NCal		modern
70	E			?*Phragmites* (Texas)	angiosperm
	R			?*Graminopyllum*	families
				(Mongolia)	and genera
	C			?*Arundo* (Nebraska)	
80	R				
	E				
	T				
90	A		Afr|S.Am (WG)		
	C				
	E				
	O				
100	U		India|Mad|Afr		
	S		WG|EG		
110					
	C			Trisulcate pollen	Angiosperms
	R			(Australia)	widespread
120	L E				
	O T			Monosulcate pollen	Angiosperms
	W A			(Australia)	in Australia
	E C				
130	R E				Angiosperms
	O				in N Gond &
	U				S Laurasia
	S				
140			Gondwanaland		
		JURAS			

Data on grass fossils are summarised from Diugan (1951) and Thomasson (1987). A question mark preceeding the generic name indicates the identification of the fossil is not unequivocal.

(1969) (Simon 1986), using a number of classificatory programs of the numerical taxonomy package (NTP) of Belbin *et al.*(1984), shows the genera of tropical Australia to be more closely related to those of tropical Asia than to those of other regions of Australia (**Figs 2–4**). At species level the relationship to tropical Asia is still fairly significant (Simon 1988). In the light of the most recent theory concerning the structure of Gondwanaland since pre-Jurassic times (Audley-Charles 1987) (**Fig. 5**), the Asian connection makes

more sense in terms of the time available to establish biogeographic links than the alternative theories that hypothesise that the first contact between Australia and a large proportion of Asia was during the mid-Miocene.

Because the evidence supports development of at least the sub-familes prior to separation of the elements of Gondwanaland we need to consider the major groups separately rather than look at the grasses as a whole. The best way is to look at each major group in turn and postulate on how they could have spread throughout Gondwanaland, including the plate of east Gondwanaland that incorporates Australia. We can then look at present-day climatic and edaphic conditions within Australia to interpret how diversification of genera and species may have taken place in more recent times.

Clayton's figure (**Fig. 1**) on the phylogeny of the grasses has no associated time framework and is based on the assumptions of what are primitive and advanced characters in extant members of the family. Primitive and advanced characters based on floral morphology were first listed 40 years ago by Hubbard (1948). To these may be added the now well-known cryptic characters derived from anatomy, cytology and physiology that have all had a great impact on the classification since the 1930's (Avdulov 1931; Stebbins 1956 and other references in Clayton & Renvoize 1986). These cryptic characters are now more important in the classification of subfamilies and major groups than those based on floral morphology and were considered in some depth at the 1986 Symposium on Grass Systematics and Evolution at the Smithsonian Institution (Soderstrom *et al.* 1987).

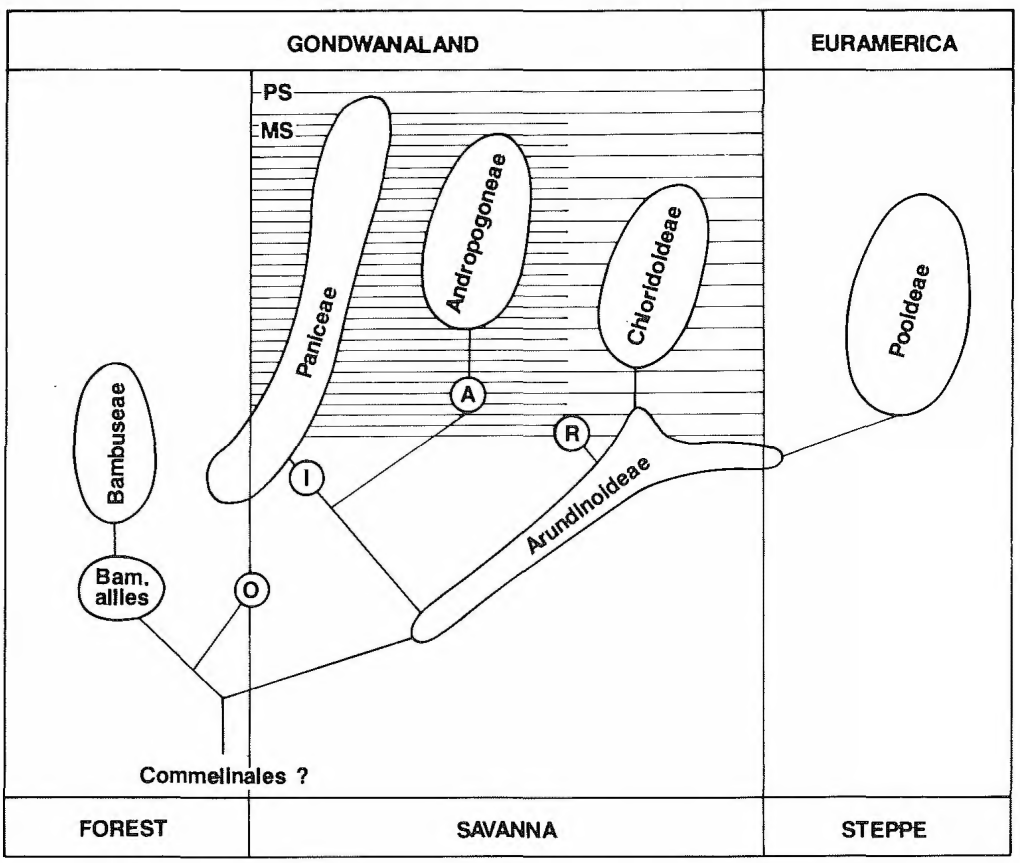


Fig. 1. Suggested relationships among the major groups of grasses. A = Arundinelleae. I = Isachneae. O = Orzeae. R = Aristideae. C_4 metaboloism is indicated by horizontal lines: it is divided into the MS and PS types of Brown (1977). (From Clayton, 1981; redrawn by permission from *Annals of the Missouri Botanical Garden* 69: 6).

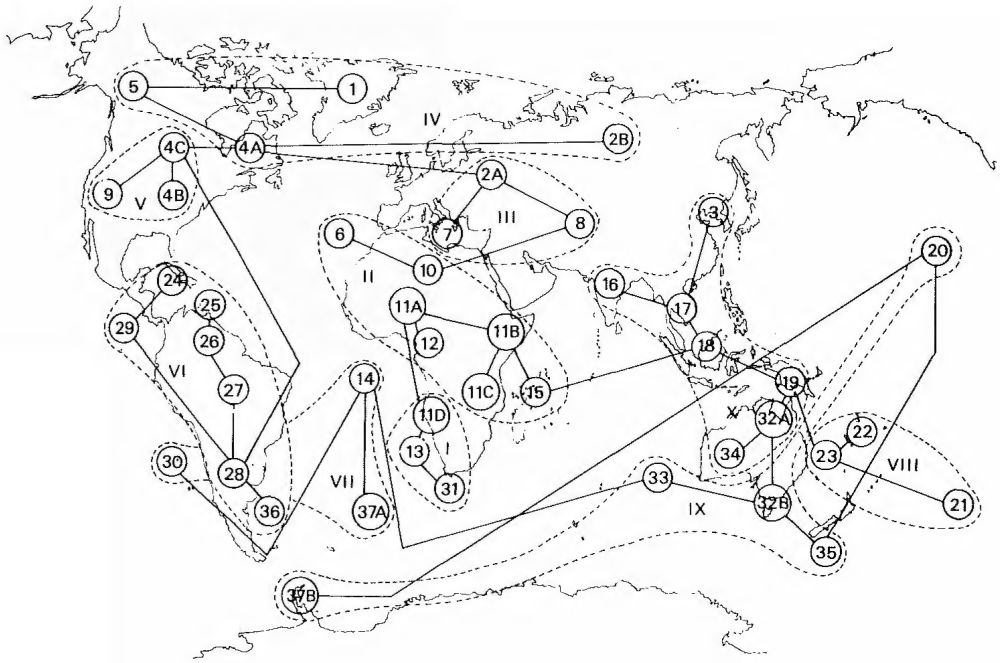


Fig. 2. Minimum spanning tree of world floristic regions based on distribution of grass genera.

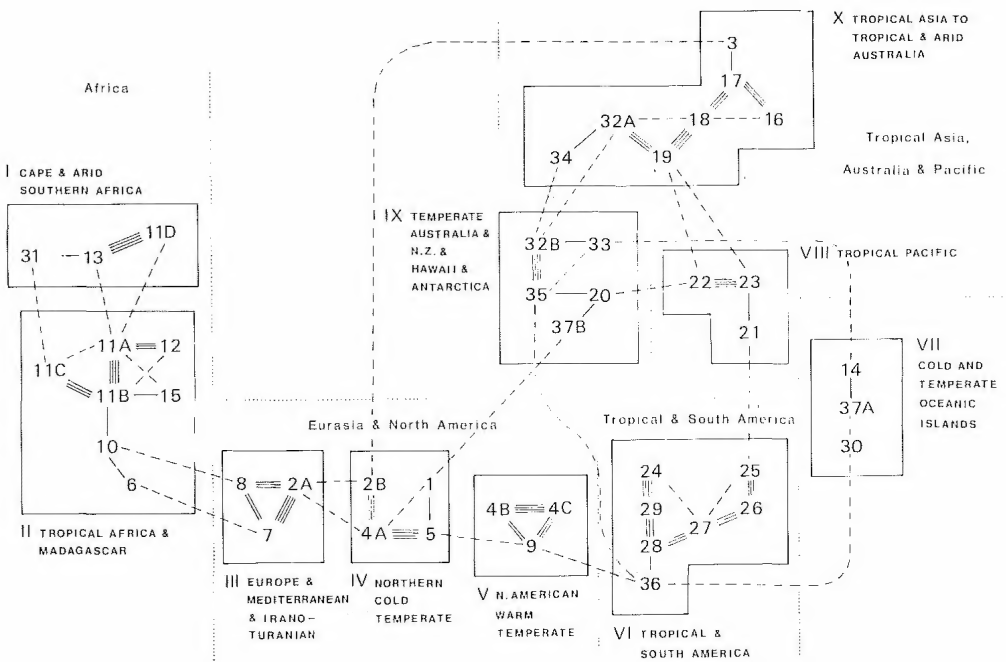


Fig. 3. Two neighbour network of world floristic regions based on distribution of grass genera. Floristic regions as in Fig. 2.

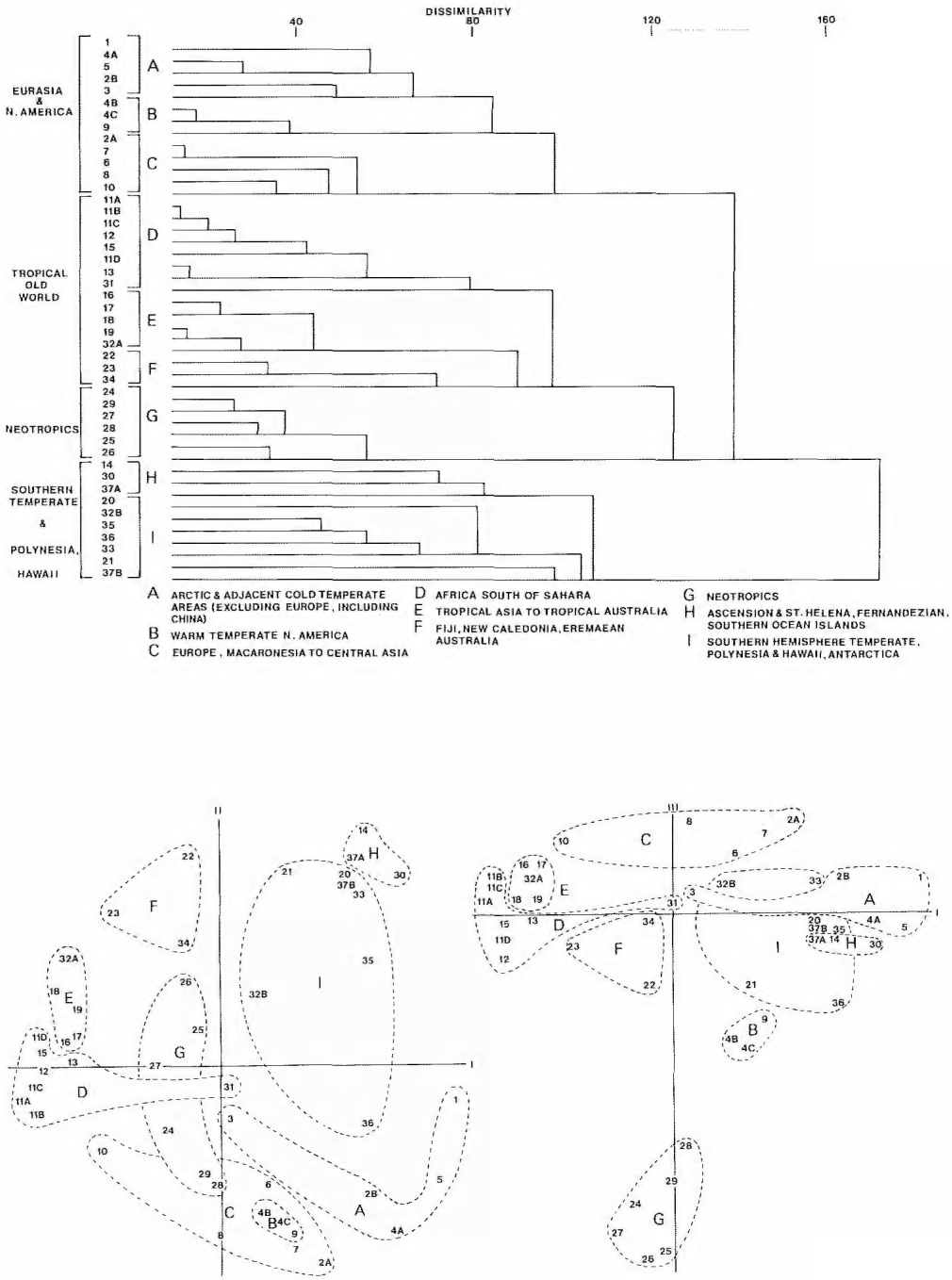


Fig. 4. Dendrogram and principal co-ordinates of world floristic regions based on distribution of grass genera. Floristic regions as in Fig. 2.

Numerical Methods

Over recent years, with the increase in the use of computers in attempting to solve problems of classification and evolution of plant groups, numerous numeric methods have been applied to the grasses. The data that exists for the family are greater than that for any other family, the most recent data base for genera being that of Watson & Dallwitz (1988). A good recent summary of numerical methods is that of Baum (1987) whereas the papers of Kellogg and Campbell (Campbell & Kellogg 1987; Kellogg & Campbell 1987) give the current state with regard to cladistic studies in the family. For example the arundinoids, as presently constituted, appear to be polyphyletic (Kellogg & Campbell 1987), with all other subfamilies being monophyletic and interspersed among them.

The arundinoids are thus not a natural group and should not be treated as such when regarded as a "group" from which other groups arose. Within the major groups some contemporary genera are suspected of being polyphyletic e.g. *Eragrostis* and allies (Jacobs 1987) and may have to be reclassified.

Cytogeography

Cytological data of value for illustrating cytogeographic pathways of Australian grass taxa is available for only three taxa – *Themeda triandra* (as *T. australis*) (Hayman 1960), *Danthonia* (Brock & Brown 1961) and the tribe Neurachneae (Prendergast & Hattersley 1985). Accordingly the use of karyology as an aid in interpreting the evolution of groups of Gondwanan grasses in Australia offers little assistance.

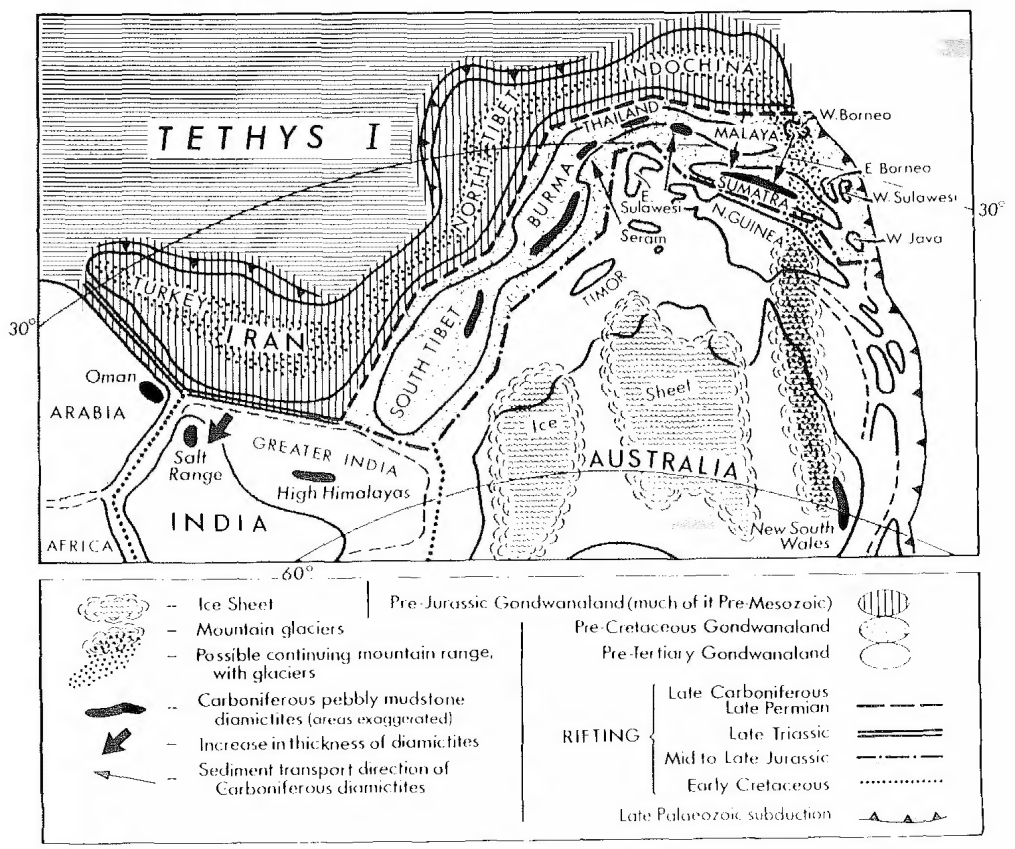


Fig. 5. Reconstruction of eastern Gondwanaland since pre-Jurassic times. (From Audley-Charles, 1987; reprinted by permission from the author and Clarendon Press).

Hybridization, polyploidy and aneuploidy have been the active features in the chromosomal evolution of the grasses (de Wet 1987). Two theories have been put forward to explain the evolution of the major groups: one theory (Clayton 1981) has the arundinoids (x = 6,7,9,10,11 or multiples of these) giving rise to the pooids (x = 7), the chloridoids (x = 9,10) and subfamily Panicoideae (x = 9,10) with the bambusoids (x = 11,12) being derived from pre-arundinoids; the second theory proposes an independent origin of all groups from an original complex with (x = 5,6,7) (Hubbard 1948; Stebbins 1985).

Polyploidy has occurred in both *Themeda triandra* and *Danthonia* species in their adapting to the more arid regions of the continent whereas in the Neurachneae the only diploid species is restricted to the Macdonnell Ranges and is interpreted as indicating a relictual presence there (Prendergast & Hattersley 1985).

Evolution of major groups of grasses in relation to Gondwanic events

Table 2 lists all the Australian genera in subfamilies or major taxonomic groups with a breakdown to the floristic elements recognized by Clifford and Simon (1981), and the number of species, both in Australia and the World. It is an expansion of **Table 2** of Clifford and Simon (1981). The percentage frequencies of genera in each major group of grasses in each of the world floristic regions of Takhtajan (1969) are given in **Maps 1–6** where the data are from Simon (1986). The numbers of species of major groups for regions of the Old World have been shown in the maps of Cross (1980).

1. Andropogonoids

The Indian and Indo-Chinese regions have the highest representation of both genera (**Map 1**) and species (Cross 1980). In general the Old World has many more genera and species than the New World, where only in one region (the Caribbean) are there more than 20% of the total number of andropogonoid genera. Furthermore no region has more than 20% of their grass floras with andropogonoid species (Hartley 1958a). Areas with a distinctly seasonal (monsoonal) rainfall of 700–1500 mm on well-drained soils have the highest representation of andropogonoids as shown in **Fig. 6**. These are the core savanna communities of Johnson and Tothill (1981). The andropogonoids could have arisen via the Arundinelleae (Clayton & Renvoize 1986), which is placed with the panicoids by some authors because it shares characters of dimorphic florets and a geniculate awn. The Arundinelleae shows a dichotomy between the arundinelloid (*Arundinella* and *Jansenella*) and loudetioid lines (all other genera) and it is probably among the loudetioid genera that we must look for the out-group of the andropogonoids. The extant loudetioid members have their main distribution in the Old World tropics with the exception of Australia (Phipps 1967). All the loudetioid genera are in tropical Africa and it is to this part of western Gondwanaland that we must look as the possible cradle of the andropogonoids. From here the group could have spread to northern Gondwanaland (the Indian plate) before the breakup of the super-continent in the mid-Cretaceous and then through other parts of tropical Asia and Australia. This dispersal could have occurred either from the Eocene, when the Indian plate collided with Eurasia, and into Australia after collision of the latter with Sundaland in the mid-Miocene (Powell *et al.* 1981) or much earlier if a recent theory concerning the composition of Gondwanaland (Audley-Charles 1987) is correct. There is almost an equal number of Australian andropogonoid genera belonging to Clifford and Simon's Gondwanan, Old World Tropics and Indo-Malayan elements (**Table 2**). They are all really Gondwanan in terms of their origin, with the two latter elements not occurring on the American plate of west Gondwanaland. There is only one genus (*Spathia*) of the Endemic element and its one species probably evolved fairly recently from *Dichanthium*. The average numbers of species/genus in these two latter elements is usually fairly small, although the genera *Iseilema* and *Thaumastochloa* have speciated fairly prolifically. At species level there are some anomalous Gondwanic distribution patterns that require explanation(s) other than plate tectonics if the thesis of species being of comparatively recent origin is correct. Examples are *Heteropogon contortus*, native to all pantropic areas and *Eulalia aurea*, *Hyparrhenia filipendula* and *Themeda triandra* (if *T. australis* is not regarded as distinct), native to all parts of the Old World tropics. Although explanations have been given for Miocene and Pliocene connections at species level in the Old World (Moreau 1952; Schnell 1962) there is a possibility of the distribution being due to

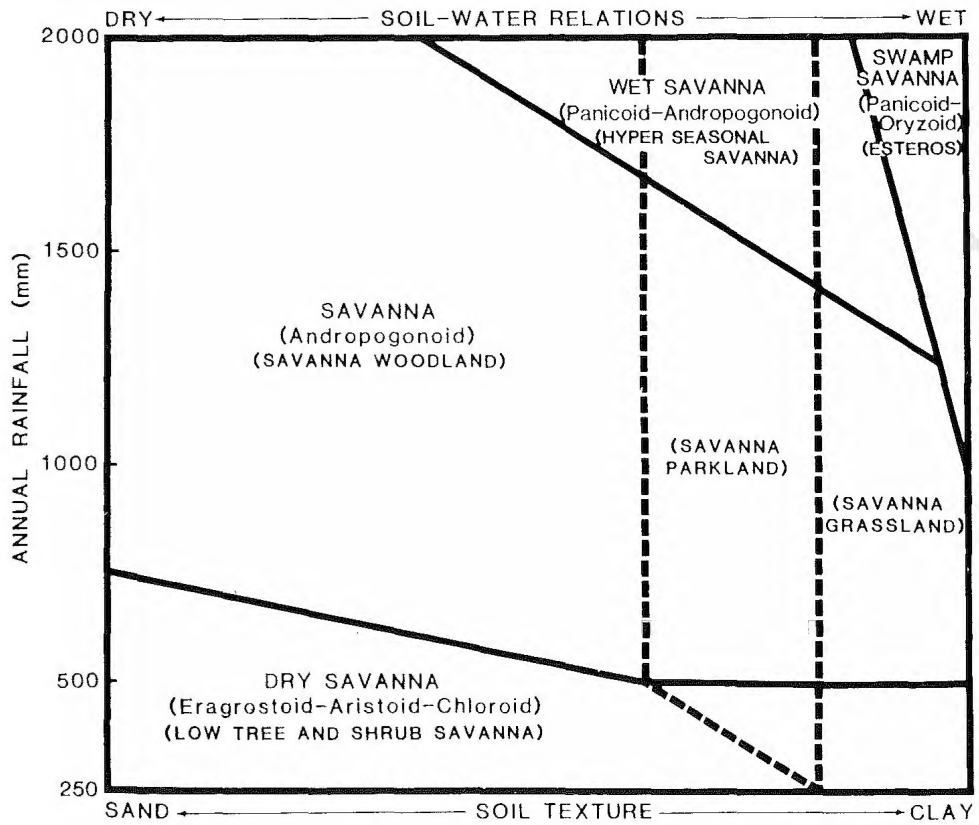


Fig. 6. Classification of savannas of the world. (From Johnson & Tothill 1986; reprinted by permission from Australian Academy of Science).

commercial exchanges at least between eastern Africa and Malesia for nearly 1000 years (Clayton 1969). The pan-Atlantic connection of species is more problematic (Schnell 1961). The biogeography of the series of *Cymbopogon* (Soenarko 1977) can be accounted for more rationally by the tectonic theory with all five series being contiguous or nearly so in their distribution patterns, with the exception of the series *Citrati*. Species of *Citrati* could have spread between Africa and Indo-China (Schnell 1962) or along arid corridors in the manner illustrated by van Steenis (1979).

The paucity of andropogonoid representation in the New World could be explained by two contrasting but not mutually exclusive hypotheses. It may either be an indication of a late arrival there in their evolutionary development or else there were few ecological niches available to spread into.

2. Panicoids

The south tropical African floristic region is best represented at both generic (**Map** 2) and species level (Cross 1980), although the latter paper only gives figures for the Old World. Other regions with a high number of panicoid genera are located in the Americas, Africa and Australia. The panicoids are best developed in the wet savannas with an annual rainfall of more than 1500 mm on moisture-retaining soils (**Fig. 6**) (Johnson & Tothill 1981). Panicoids have a variety of photosynthetic pathways (C_3 and C_4 of both Kranz MS and PS types) enabling different species to exploit wet, high-light, shaded and arid habitats. From an east African-Madagascan origin in west Gondwanaland of the subfamily Panicoideae (to which the panicoids and andropogonoids both belong) the panicoids are thought to have spread early throughout Gondwanaland. If the arundinelloid line of the Arundinelleae is regarded as the ancestor for the panicoids this would be a

plausible theory as the genus *Arundinella* is pan-Gondwanic in its distribution. The Australian panicoids have a higher endemic component than the andropogonoids. For example there are 13 genera of the Endemic element and of the other floristic elements a high percentage of the species are endemic (**Table 2**). These endemic species are probably of recent rather than ancient origin and evolved by adapting to environmental changes on the subcontinent in the Tertiary, even though the genera themselves originated before continental rafting.

3. Chloridoids

As with the panicoids the chloridoids have most genera in the south tropical African floristic region (**Map 3**) as they do at species level in the Old World (Cross 1980). They are best developed in areas with an annual rainfall of less than 700 mm falling mainly in summer (**Fig. 6**) i.e. the dry savannas (Johnson & Tothill 1981), although there are more species in the wetter tropical regions of Africa, Asia and Australia than in the arid zones. The percentage method (Hartley & Slater 1960) indicate regions of high chloridoid presence in the arid belts centred on the tropics of Cancer and Capricorn. Whereas the total number of grass species is not large, a very high proportion of those species that have been able to adapt, are chloridoids. The percentage method may only be indicating areas of relative specialisation rather than areas of origin. Treating such areas as places of relative specialisation is in line with Smith-White's (1982) conclusion that spread and speciation in the arid areas of Australia is based on the species growing on the periphery of those areas. Another reason for Hartley and Slater's high figures for the arid region is that they included *Aristida* in the chloridoids whereas subsequent work has shown this genus better placed with the arundinoids. When looking only at Australian chloridoid genera they show a similarity to the panicoids in terms of their breakdown into the floristic elements of Clifford and Simon (Endemic:Old World Tropics:Gondwanan – 12:9:9 chloridoid compared to 13:7:15 panicoid). As with the panicoids endemic genera and species probably arose relatively recently in response to local conditions. For example Jacobs (1982, 1987) postulates a diversification at and below the species level within the endemic genera *Triodia* and *Plectrachne* in the late Pleistocene, with *Triodia* (and the recently described genus *Symplectrodia*) adapting to monsoonal and arid regions of central, northern and western Australia and *Plectrachne* to the Mediterranean climate of southwest Western Australia. The African plate is suggested as an area for the origin of the chloridoids (Hartley & Slater 1960) on the basis that, of the genera occurring on more than one continent, all except one are found in Africa. However Jacobs (1982, 1987) does not postulate more than that the chloridoids originated in Gondwanaland. In terms of their phylogeny it appears that the group may be polyphyletic (Jacobs 1987) as may also be some of the larger genera e.g. *Eragrostis* and *Sporobolus*.

4. Bambusoids

In this treatment the bambusoids are regarded in the broad sense to include the woody bamboos, the herbaceous bamboos, the oryzoids and the centothecoids. The woody bamboos are unique in terms of the biogeographic range their genera occupy, from tropical lowlands to montane zones more than 4000 m high and latitudes from 46°N to 47°S (Ohrnberger & Goerrings 1985; Soderstrom & Calderon 1979). Floristic regions with high representation of bambusoid genera are shown in **Map 4**. Australia is poorly represented with supposedly one genus (*Bambusa*) consisting of three species. In reality the Australian species probably represent three distinct genera from two different tribes though further work is required to clarify the situation. The herbaceous bamboos (tribes Olyreae and Phareae) are not found above 1500 m and are centred in the neotropics; only two genera (*Leptaspis* and *Scrotochloa*) occur in Australia. The oryzoids (rice grasses) are pantropic, associated with wet habitats (**Fig. 6**), the swamp savannas of Johnson and Tothill (1981); they are bamboo allies, possessing at least six of the ten anatomical characters that demarcate the bambusoid core group i.e. the woody and herbaceous bamboos (Soderstrom & Ellis 1987). The tribes Centotheceae and Ehrharteae are treated as bambusoids in this paper although not regarded as such by Soderstrom and Ellis (1987). The first is a pantropic group of rainforest-floor species and the second is represented in warm temperate to montane areas of the Old World. The regions with most bambusoid genera are Indo-China, the Caribbean, Eastern Asia, the Central Brazilian and Amazon regions of tropical America, and India. The bambusoid genera have a much

Table 2. Biogeographic elements (updated and expanded from Clifford & Simon 1981) of Australian grass genera.

Biogeographic Elements	Total	Genus	Species Number Australia	Total
1. Andropogonoid				
Endemic	1	*Spathia*	1	1
Australasian	0	–		
Indo-Malayan	11	*Apluda*	1	1
		Chionachne	2	7
		Coix	2	5
		Dimeria	3	35–40
		Eremochloa	3	9
		Germainia	3	9
		Iseilema	14	c.20
		Pogonatherum	1	3
		*Polytrias*1	1	1
		Pseudopogonatherum 2	2	
		Thaumastochloa	8	8
Old World Tropics	13	*Arthraxon*	2	c.10
		Capillipedium 2	c.14	
		Cymbopogon	9	c.40
		Dichanthium	6	c.20
		Eulalia	4	c.30
		Hyparrhenia	1	55
		Microstegium	1	c.15
		Ophiuros	1	4
		Rottboellia	1	?1
		Saccharum	1	35–40
		Sehima	1	5
		Themeda	3	18
		Vetiveria	4	10
Africa	0	–		
America	0	–		
Gondwanan	11	*Bothriochloa*	7	c.35
		Chrysopogon	6	26
		Elionurus	1	15
		Hemarthria	1	12
		Heteropogon	2	6
		Imperata	1	8
		Ischaemum	7	c.65
		Mnesithea	5	32
		Schizachyrium	7	c.60
		Sorghum	14	c.20
2.2. Panicoid				
Endemic	13	*Arthragrostis*	2	2
		Calyptochloa	1	1
		Chamaeraphis	1	1
		Homopholis	2	2
		Hygrochloa	2	2
		Neurachne	6	6
		Paractaenum	1	1
		Paraneurachne	1	1
		Plagiosetum	1	1
		Thyridolepis	3	3
		Uranthoecium	1	1
		Whiteochloa	5	5
		Zygochloa	1	1
Australasia	1	*Cleistochloa*	3	3

Indo-Malayan	6	*Ancistrachne*	2	3
		Garnotia	1	29
		Pseudoraphis	3	6
		Spinifex	4	4
		Xerochloa	3	3
		Yakirra	6	7
Old World Tropics	7	*Alloteropsis*	2	5
		Coelachne	1	10
		Cyrtococcum	1	11
		Holcolemma	1	4
		Ottochloa	2	4
		Thuarea	1	2
Africa		*Entolasia*	3	5
America	0	–		
Gondwanan	15	*Arundinella*	4	c.50
		Brachiaria	18	c.100
		Cenchrus	3	22
		Digitaria	32	c.230
		Echinochloa	9	30–40
		Eriochloa	6	30
		Isachne	3	c.100
		Oplismenus	5	5
		Panicum	24	c.500
		Paspalidium	22	c.40
		Paspalum	3	c.330
		Pennisetum	3	c.80
		Sacciolepis	2	30
		Setaria	7	c.100
		Stenotaphrum	1	7
Ind-Mal/Tr.Am.	2	*Hymenachne*	1	5
		Ichnanthus	1	33
3. Chloridoid				
Endemic	12	*Astrebla*	4	4
		Austrochloris	1	1
		Cynochloris	2	2
		Heterachne	3	3
		Monodia	1	1
		Oxychloris	1	1
		Planichloa	1	1
		Plectrachne	16	16
		Psammagrostis	1	1
		Symplectrodia	2	2
		Thellungia	1	1
		Triodia	c.35	c.35
Australasia	1	*Ectrosia*	11	11
Old World Tropics	10	*Brachyachne*	5	9
		Cynodon	2	c.8
		Dactyloctenium	1	13
		Elytrophorus	1	2
		Enteropogon	6	17
		Eragrostiella	1	5
		Lepturus	4	c.8
		Perotis	2	c.10
		Zoysia	2	c.10
Africa	1	*Triraphis*	1	7
America	0	–		
Gondwanan	9	*Chloris*	6	c.55
		Diplachne	2	
		Enneapogon	18	28
		Eragrostis	51	c.350
		Leptochloa	7	

		Microchloa	1	c.6
		Sporobolus	17	c.160
		Tragus	2	7
		Tripogon	1	c.30
Tmp N&S Am.	1	*Distichlis*	1	c.5
4. Arundinoid				
Endemic	9	*Amphipogon*	5	5
		Anisopogon	1	1
		Cyperochloa	1	1
		Diplopogon	1	1
		Micraira	13	13
		Monachather	1	1
		Notochloe	1	1
		Plinthanthesis	3	3
		Spartochloa	1	1
Australasia	3	*Chionochloa*	1	c.20
		Erythranthera	2	
		Pheidochloa	1	2
Old World Tropics	1	*Elytrophorus*	1	2
Africa	1	*Triraphis*	1	7
Indo-Malayan	1	*Eriachne*	43	43
Gondwanan	1	*Aristida*	54	c.250
Cosmopolitan	2	*Danthonia*	3	1
		Phragmites	2	3–4
5. Stipoid				
Cosmopolitan	1	*Stipa*	62	c.300
6. Pooid				
Endemic	4(7)	*Australopyrum*	3	3
		Austrofestuca	2	2
		Dryopoa	1	1
		(*Neuropoa*)	1	1
		Pentapogon	1	1
		(*Festucella*)	1	1
		(*Hookerochloa*)	1	1
Australasia	2	*Dichelachne*	7	7
		Echinopogon	7	7
I-M,NZ,SAm	1	*Deyeuxia*	35	
SAm,NZ	1	*Amphibromus*	10	
Cosmopolitan	9	*Agrostis*	17	c.220
		Deschampsia	2	c.40
		Festuca	7	c.450
		Glyceria	3	c.40
		Hierochloe	4	c.30
		Poa	34	c.500
		Polypogon	2	18
		Puccinellia	2	c.80
		Trisetum	1	c.70
7. Bambusoid				
Endemic	2	*Potamophila*	1	1
		Tetrarrhena	4	4
Indo-Malayan	3	*Lophatherum*	1	2
		Microlaena	2	
		Scrotochloa	2	2
Old World Tropics	2	*Centotheca*	2	4
		Leptaspis	1	5
America	1	*Bambusa*	3	c.120
Gondwanan	2	*Leersia*	1	18
		Oryza	3	c.20

higher degree of endemism than other major groups, with only two genera (*Leersia* and *Oryza*) being present in all four continents of America, Africa, Asia and Australia; species of both genera inhabit wet areas and are likely to have been spread by waterbirds. The cradle of the bamboos is open to much speculation. Some authorities think bamboos have been in existence for 100 to 200 million years (Breedlove in Farrelly 1984). If this is so they were well established in Gondwanic times but their subsequent development in the two main areas of the neo-tropics and tropical Asia must have been since the Eocene with the Indian or Australian rafts transporting the gene pool to the Asian region where they subsequently differentiated. There is a large variation in herbaceous genera in the neo-tropics. If herbaceous bamboos are considered primitive, or at least a large number of their character states are considered primitive, then the neotropics could be considered as a centre of origin for the group. Some of the herbaceous species also exhibit highly derived characters such as subterranean flowering.

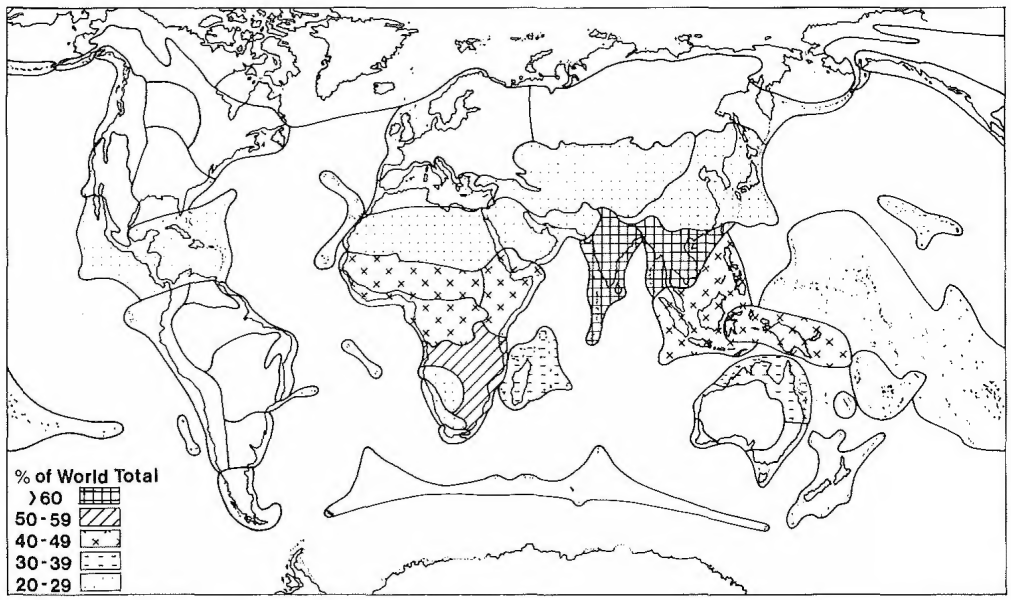
The paucity of extant records in both Africa and Australia could be a result of extinction in these continents during phases of aridity (Moreau 1952; Galloway & Kemp 1981). The woody bamboos (tribe Bambuseae) are represented in Australia and Africa by one (two?) and three subtribes (one (three?) and 11 genera) respectively, whereas there are five subtribes present in both Asia and America (60 and 20 genera) (Soderstrom & Ellis 1987; Ohrnberger & Goerrings 1985).

5. Arundinoids

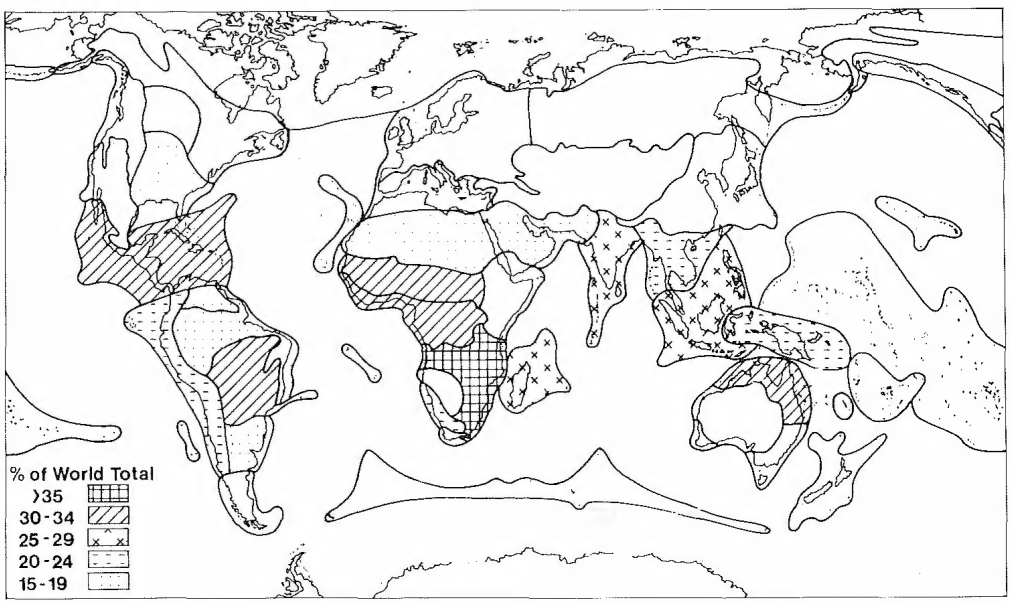
This group is so fraught with problems in its taxonomy that any attempt to understand aspects of phylogeny or origin of the group, either wholly or partially, must take this into account. A good overview of the subfamily is given by Renvoize (1981), who implied the group is made up of genera that cannot reasonably be accommodated in the other generally recognized subfamilies. Views differ as to component tribes of the group, with some tribes sometimes being placed with the bambusoids or chloridoids. Even the central tribe Arundineae has been treated differently in recent times, either being regarded as three tribes Arundineae, Danthonieae and Cortaderieae (Conert 1987) or as one (Renvoize 1981; Watson & Dallwitz 1988). One major problem is that there is no really satisfactory taxonomic treatment of *Danthonia.* Generic segregates have been made in an unbalanced manner on the basis of rather minor characters. Conert has erected generic segregates in Africa (Conert 1966, 1970, 1971) but resisted from doing so in Australasia, although he did recognize *Chionochloa*, segregated from *Danthonia* (Conert 1975). The genus *Rytidosperma* (*Notodanthonia*) has been segregated in Australasia and South America (Blake 1972; Connor & Edgar 1979; Clayton & Renvoize 1986; Nicora 1973; Tomlinson 1985; Zotov 1963) but as the character states do not correlate with the circumscriptions, we consider this separation to be premature pending the availability of more data. With the arundinoids being limited to the tribes listed by Renvoize (excluding Ehrharteae and Centotheceae) most arundinoid genera (**Map 5**) and species (Cross 1980) occur in the Cape and Namib regions of Southern Africa. Australia rates well at species level, with high numbers in all States, with *Danthonia* having many species in temperate areas and *Eriachne* and *Aristida* well represented in tropical areas. There are only six genera in the whole of the New World. As the arundinoids are classified at present they are polyphyletic (Kellogg & Campbell 1987) so hypothesising on their origin has little meaning. However, the Gondwanic nature of most of the genera is evident by their present distribution which is deduced to be the result of a long and independent evolution. The theory that the non-bambusoid groups arose from the arundinoids implies the latter have been pushed to the southern extremities and mountains of Gondwanic fragments by the groups they gave rise to (Clayton & Renvoize 1986). Although this appears to be the situation in a number of small genera, in other arundinoid genera evolution has continued, giving rise to genera with many species in different environments e.g. *Aristida* and *Eriachne* in arid regions, and *Danthonia* in Mediterranean climates. The arundinoids have adapted to more habitats than any other group and this is perhaps another indication of their relative age.

6. Stipoids

The stipoids are taxonomically treated as a single tribe Stipeae but opinions differ as to which subfamily they belong. Although traditionally placed with the pooids (see references in Barkworth & Everett 1987) increasing evidence is being assembled that



Map 1. Distribution of andropogonoid genera.



Map 2. Distribution of panicoid genera.

they do not really belong here (Campbell 1985; Macfarlane 1987). A current trend is to either place them with the arundinoids (Watson & Dallwitz 1988) or the bambusoids (references in Campbell 1985). Because of the uncertainty of their relationships it is probably best to regard them as a group in their own right when discussing their phylogeny. Within the group 10–15 genera have been described, being mainly variations from the first described and largest genus *Stipa*. However, as presently constituted, the genera are not natural and a recent attempt has been made to divide the group into monophyletic taxa without formal names (Barkworth & Everett 1987). There are five Australian groups of *Stipa* and the closest outgroup for the Australian species are those from Eurasia (especially *Achnatherum*). They believe the group to be Gondwanic in origin and that lines have radiated into Australia, Eurasia and America. Their "*Archeostipa*" could be interpreted as radiating from Antarctica into South America and Australia about 35 million years ago or even substantially earlier in the Oligocene when these parts of Gondwanaland were separating. The entry of stipoid grasses into North America was able to take place at the end of the Miocene 10 million years ago with the joining of the Americas. Some of the best known grass fossil remains are of antheocia of stipoid grasses from the Miocene and Oligocene deposits in the United States of America (Thomassen 1987) at a time when horses and pronghorn antelopes were evolving contemporaneously (Stebbins 1981). It is also possible that their spread into North America was from the north or from both directions. The derivation of the Eurasian lines is more problematical due the paucity of records in Africa (a few species of *Stipa*) and Asia (species of *Oryzopsis*, *Stipa* and *Trikeraia* all in the Himalayas). Ancestral *Stipa* may have been present in areas near the northern leading edge of the fragments of eastern Gondwanaland or in India.

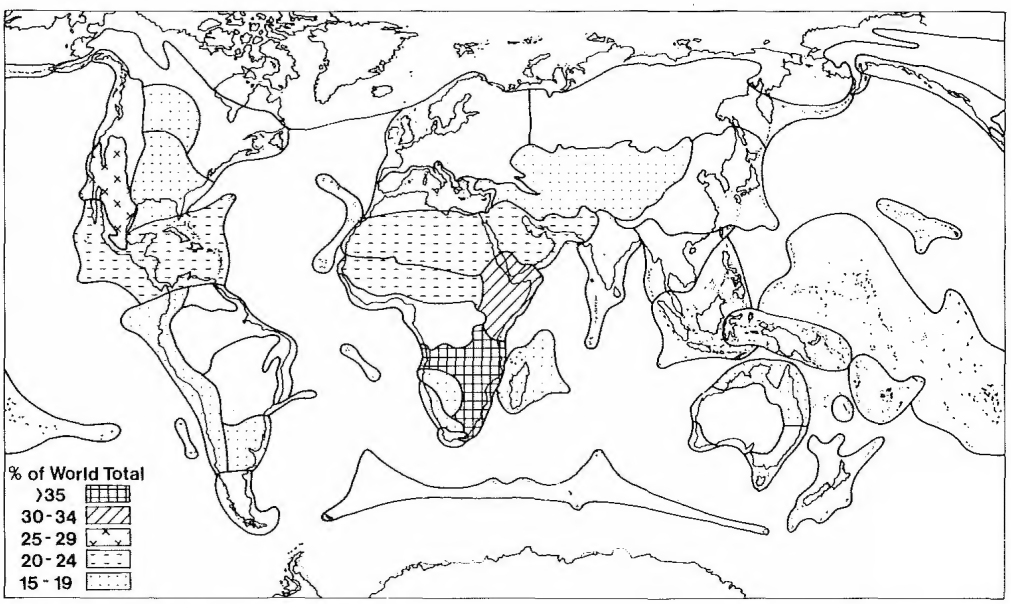
7. Pooids

This is one of the largest subfamilies of grasses with 20% and 30% of the generic and species totals for the family (Macfarlane 1987). Its members predominate in regions of high latitude and altitude i.e. the temperate regions of the world. The centres of generic (**Map 6**) and species richness (Cross 1980) are Europe, the Mediterranean and the Irano-Turanian regions with gradually decreasing numbers for other less temperate regions. However pooids occur in most areas of the Northern and Southern Hemispheres in both Old and New Worlds where there is a suitable climate. How or when they achieved their present distribution is as much a mystery as to how they evolved. One view is that they spread to their present range relatively recently (since the Miocene) by traversing tropical regions along montane stepping stones. Entry from North to South America must have occurred on a small scale before the joining of these continents in the Pliocene but the rate of spread must have been accelerated subsequently. The entry to Australia of the relatively high pooid component of the grass flora, both the time of arrival and route of entry, is not established (Connor & Edgar 1986) but theories have been given (Clifford & Simon 1981). An entry route via Antarctica since the early Miocene seems feasible before the completion of the polar ice-cap formation whereas entry from the north (van Steenis in Burbidge 1960) appears less likely due to the great distances between blocks of elevated land. Audley-Charles (1987) does, however, postulate the formation and subsequent loss of islands that could have been used as "stepping stones". The pooids have been thought to have evolved from a section of C_3 arundinoids (Clayton 1981; Renvoize 1981) although recent cladistic studies (Kellogg & Campbell 1987) places the pooids at the base of the tree next to the outgroup *Joinvillea*. Such a relationship supports the hypothesis of Tsvelev (1969) that the grasses evolved from pooid type ancestors in high mountains with later movement to the plains.

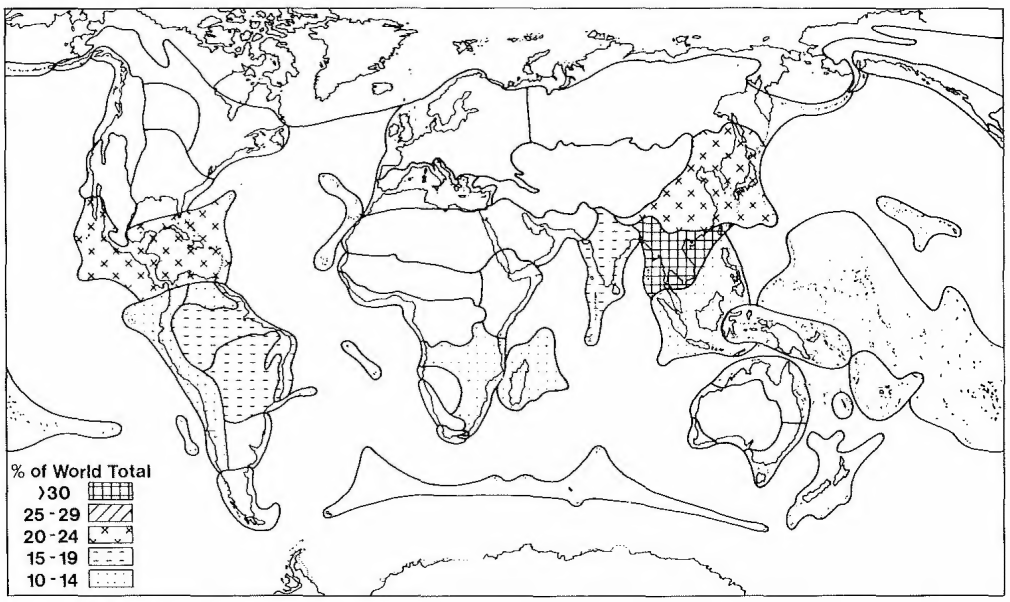
Current Distribution of Australian Grasses

The present distribution of the grasses is a reflection of their pre-historic biogeography and their development and specialisation into a variety of habitats. One suite of environmental specialisations relates to their photosynthetic pathways and the pattern described for southern Africa by Gibbs Russell (1986) for the five subfamilies recognized by her can be applied generally as well as for Australia.

> "Panicoideae (mainly C_4 malate formers) in mesic summer rainfall regions; Chloridoideae (mainly C_4 aspartate formers) in arid summer rainfall regions; and Arundinoideae (mainly C_3) in regions with more than 40% winter rainfall. Pooideae



Map 3. Distribution of chloridoid genera.



Map 4. Distribution of bambusoid genera.

form a large component of the grass flora in high altitude areas (and areas of high latitude in Australia and generally)."

Her statement that the "Bambusoideae has very few taxa and never forms a major component of the grass flora" is applicable to the situation in Australia but not generally. Although the distribution of grasses in Australia has been correlated by Hattersley (1983) with the photosynthetic pathway the results have not been extended to subfamily regions in the way that Gibbs-Russell has done for southern Africa, although an attempt has been made to correlate the decarboxylation types of C_4 grasses to geographical regions (Prendergast *et al.* 1986, Prendergast 1989).

Due to the active role Australia has had in the development of introduced pastures there is a considerable grass flora of a much more recent exotic origin, both from tropical and temperate regions (Clifford & Simon 1981). Large areas of the Australian landscape are now dominated by exotic species and areas of the coastal tropics have been said to have been Africanised (Simon 1983) in the same way as the New World tropical grasslands (Parsons 1970). It was mainly in the the savannas of Africa that today's successful forage grasses co-evolved with a host of wild herbivores (Clayton 1983) although the same process was also occurring in other localities (Stebbins 1981).

Conclusion

After an examination of each of the seven major groups of grasses recognized by us (andropogonoids, panicoids, chloridoids, arundinoids, bambusoids, stipoids and pooids) with respect to their possible areas and methods of origin, we observe that all except the pooids are considered to be Gondwanan in origin. This conclusion is in basic agreement with that of Clifford and Simon (1981). However none of these groups, on the basis of the accounts given in this paper, can be considered to be authochthonous in the sense of some rainforest groups (Webb, Tracey & Jessup 1986), in that they, or their precursors, all originated in other areas of Gondwanaland and made their way here subsequently. After arrival, adaptation to aridity and to extremes of soil types in the Tertiary (Specht 1981) became the main challenge faced by all plant groups and in the grasses a number of strategies must have been used by the genera *Aristida, Enneapogon, Eragrostis* and *Triodia*, that now dominate the arid zones of the continent (Jacobs 1982).

Acknowledgements

We thank Will Smith for modifying Figs 2–4, originally drafted by Simone Stewart for a poster presentation on grass biogeography by B.K.S. at the Symposium on Grass Systematics and Evolution at the Smithsonian Institution, Washington D.C. in 1986, and for preparing the maps. We thank the original publishers for the reproduction of Figs 1, 5 and 6 and these are individually acknowledged in the captions.

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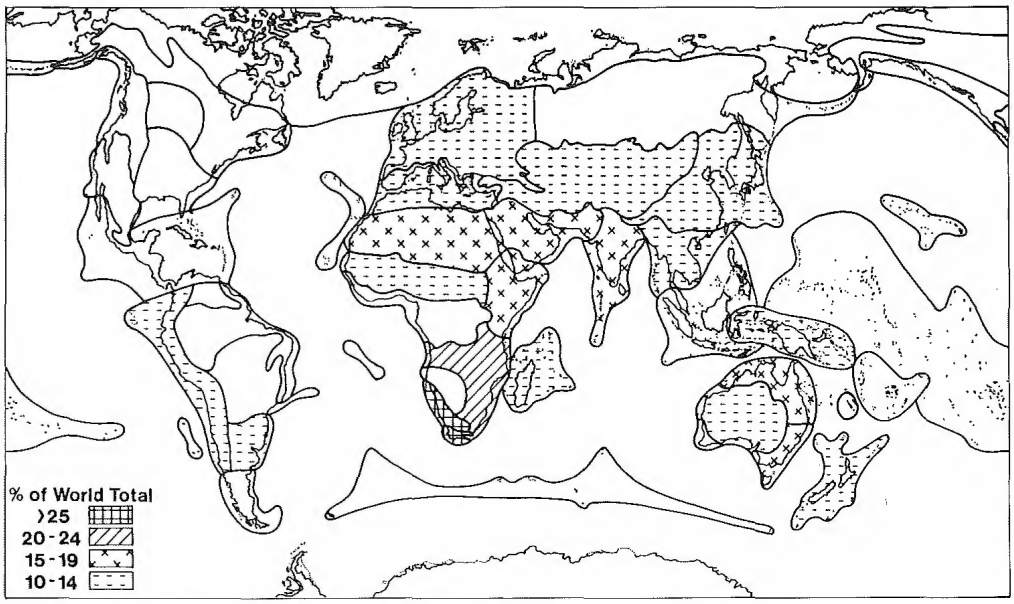
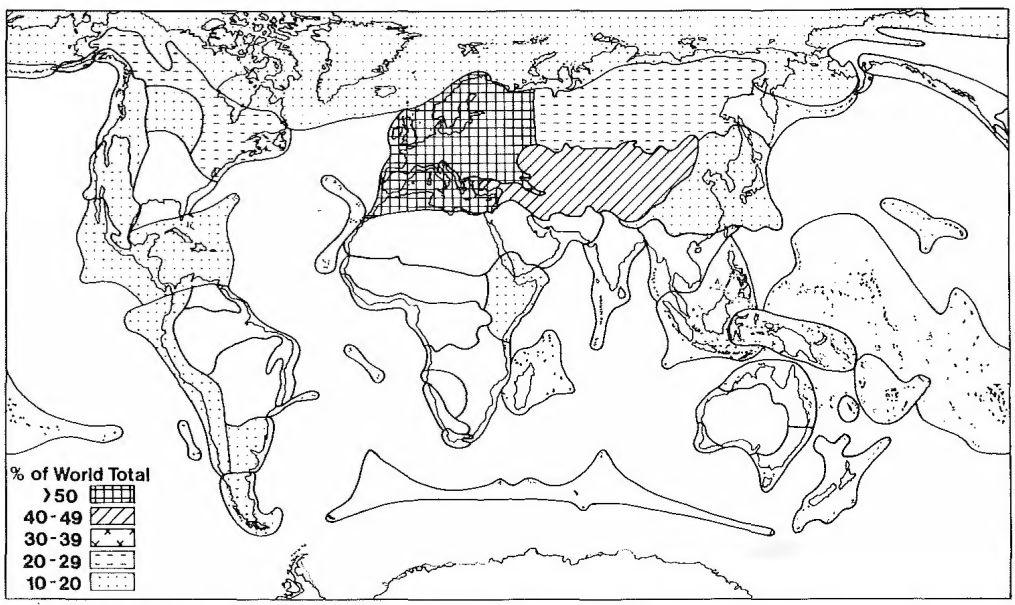


Map 5. Distribution of arundinoid genera.



Map 6. Distribution of pooid genera.

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Accepted for publication 2 February 1990

ACACIA PORCATA (MIMOSACEAE), A NEW SPECIES FROM SOUTH-EAST QUEENSLAND

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Summary

***Acacia porcata* P. Forster is described and compared with *A. longipedunculata* Pedley. It has a restricted distribution in the southern part of the Burnett Pastoral District, Queensland and occurs in an area rich in endemic taxa.**

Species of *Acacia* section *Lycopodiifoliae* Pedley are characterised by regular, verticillate phyllodes and associated stipules (Pedley 1978, 1986). The architecture and development of the phyllode-stipule whorls are unusual within this section of *Acacia* and studies of *A. longipedunculata* Pedley and allied species have resulted in new interpretations of the relationships between pinnate juvenile leaves, phyllodes, stipules and hairs in *Acacia* (Rutishauser & Sattler 1986; Sattler *et al.* 1988).

During a vegetation survey in the Mundubbera Shire, south-east Queensland, a population of a distinctive *Acacia* taxon allied to *A. longipedunculata* was discovered and is considered to represent a new species. Previously *A. baueri* Benth., an atypical member of section *Lycopodiifoliae*, was the only member of the section to be recorded south of the Tropic of Capricorn in eastern Australia with most species growing in northern Australia (Pedley 1972, 1978; Maslin & Pedley 1988).

Acacia porcata P. Forster **sp. nov.** affinis *A. longipedunculatae* Pedley, sed phyllodiis 13–19 in quoque verticillo, tubo calycis non porcato, lobis calycis ovatis, leguminibus complanatis, 11–27 mm longis, 5–6 mm latis, costa prominenti longitudinali extus praeditis differt. **Typus**: Queensland, BURNETT DISTRICT: 5.5 km W of "Toondahra", August 1988, *P.I. Forster* 4673 & *C.G. Wilkinson* (holo: BRI; iso: PERTH).

Decumbent shrub less than 0.5 m tall; branchlets terete, resinous, becoming greyish, indumentum of dense, stiff, white hairs 1–1.5 mm long; internodes to 3 cm long, 2–3 mm diameter. Phyllodes ± terete, 5–30 mm long, 0.5–1 mm diameter, venation obscure, tapered at the base and abruptly contracted at the apex into a mucro c. 0.25 mm long, straight or slightly incurved in upper part, viscid, olive-green, with sparse covering of white hairs similar to those on branchlets, 13–19 per whorl; stipules persistent, similar in number to phyllodes in whorl, brown, upright, subulate, deep red-brown, to c. 1 mm long. Heads 35–40-flowered, globular; peduncles 10–20 mm long, usually much longer than the phyllodes, viscid; bracteoles linear-lanceolate, c. 2 mm long and 0.5 mm wide, with stiff white hairs. Flowers 5-merous; calyx tube 1–1.25 mm long, c. 1 mm diameter; lobes lanceolate-ovate, tips strongly incurved, 0.75–1 mm long, c. 0.5 mm wide, with few sparse hairs externally; corolla tube c. 1 mm long and 1 mm diameter; lobes ovate-lanceolate, not striate, 1–1.5 mm long, c. 0.5 mm wide, with few sparse hairs externally; stamens c. 2–3.5 mm long; anthers 0.1–0.2 mm long; pistil 3–3.5 mm long, glabrous; ovary c. 1 mm long and 0.5 mm wide, glabrous. Pod sessile, flat, viscid, 11–27 mm long, 5–6 mm broad, conspicuously ridged externally along middle above seeds, containing 1–4 seed, dehiscent. Seed arranged longitudinally in pod, black, shiny, slightly viscid, with slight ridge on side, c. 5 mm long, 3.5 mm broad and 1.5 mm thick; aril c. 2 mm long, white. **Fig. 1.**

Other Specimen examined: Queensland. BURNETT DISTRICT: 5.5 km W of "Toondahra", Nov 1988 (fruiting), *Forster* 4827 (BRI).

Distribution, habitat and ecology: *A. porcata* is restricted to a small area in Mundubbera Shire, c. 45 km SSE of Mundubbera. The new species was collected growing on a granite rock outcrop at c. 440 m among *Triodia* sp. with a scattered overstory of *Eucalyptus* sp. aff. *E. paniculata*, *E.* sp. aff. *peltata* subsp. *leichhardtii* and *E. exserta* F. Muell. Other species in close association were *Grevillea whiteana* McGillivray, *G. floribunda* R. Br.,

Acacia grandifolia Pedley, *A. tenuinervis* Pedley, *A. eremophiloides* Pedley & P. Forster, *A. leiocalyx* (Domin) Pedley, *A. buxifolia* subsp. *pubiflora* Pedley, *Newcastelia velutina* Munir, *Platysace lanceolata* (Labill.) Druce, *Lysicarpus angustifolius* F. Muell., *Xanthorrhoea johnsonii* Lee and *Cryptandra* sp. nov.

The area supports a large fuel-load of *Triodia* species and other taxa, and it would be expected that the population would be subjected to occasional wildfires.

Phenology: Flowering in August and probably also in September, fruiting in November.

Notes: The form and number of phyllodes, number of flowers per head and calyx and bracteole morphology were considered to be useful diagnostic taxonomic characters for species related to *A. porcata* (Pedley 1972). The 12 species previously known in the section *Lycopodiifoliae* (Pedley 1978) were divisible into four groups on the basis of calyx type (Pedley 1972). *A. porcata* appears to be most closely related to *A. longipedunculata* in most characters but does not have a conspicuously ribbed or thickened calyx tube as in that species. The sepals of *A. porcata* are more similar to those of *A. galioides* Benth., *A. chippendalei* Pedley and *A. orthotricha* Pedley, but in other characters it is not particularly close to these taxa. The pod of *A. porcata* is unlike that of any of the other species of the section and is unusual for the genus in Queensland due to the longitudinal ridge on the outside. The pod is also noteworthy for the small number of septa and seeds present; single-seeded pods being quite common (**Table 1**). The maximum number of seed per pod in *Acacia* species has been found to be correlated to the number of pollen grains in a polyad with the pod seed number never exceeding the polyad grain number (Kenrick & Knox 1982). Examination of polyads of *A. porcata* revealed that they contain eight grains. It has not been possible to observe ovule number, although ultimately it will be this rather than polyad grain number that is related to seed set per pod.

While several species of *Acacia* have viscid foliage, none have been recorded as having viscid seed. The viscid nature of the seeds of *A. porcata* is probably due to the viscid substance on the pods infiltrating through the pod wall on to the seeds. As noted by Pedley (1978), few collections are made of fruiting Acacias and further observations on other species are desirable to investigate this situation fully.

A. porcata has seeds with a small white aril that may be classified as 'ant-dispersed diaspores' (O'Dowd & Gill 1986). The viscid nature of both the pods and seeds, results in a compound dispersal unit of up to 7 pods with associated seeds. This unit is dispersed by gravity and wind for up to 3 m from the parent plant with the actual distance of dispersal being determined by surrounding rocks.

Table 1. Percentage of seeds per pod in a sample of 146 pods of *Acacia porcata*.

	Number of seeds per pod			
	1	2	3	4
Percentage of pods	38	47	14	1

Conservation status: *A. porcata* is presently known from the type locality where six plants have been observed within an area of 200 m^2. A provisional conservation coding of 1E (after Briggs & Leigh 1988) is given. As outlined by Pedley & Forster (1986) and Forster (1987), the general area where this species of *Acacia* has been found has a number of restricted endemic taxa and is worthy of conservation.

Etymology: The epithet alludes both to the ridged nature of the outside of the pod and to the hilly/ridged nature of the habitat.

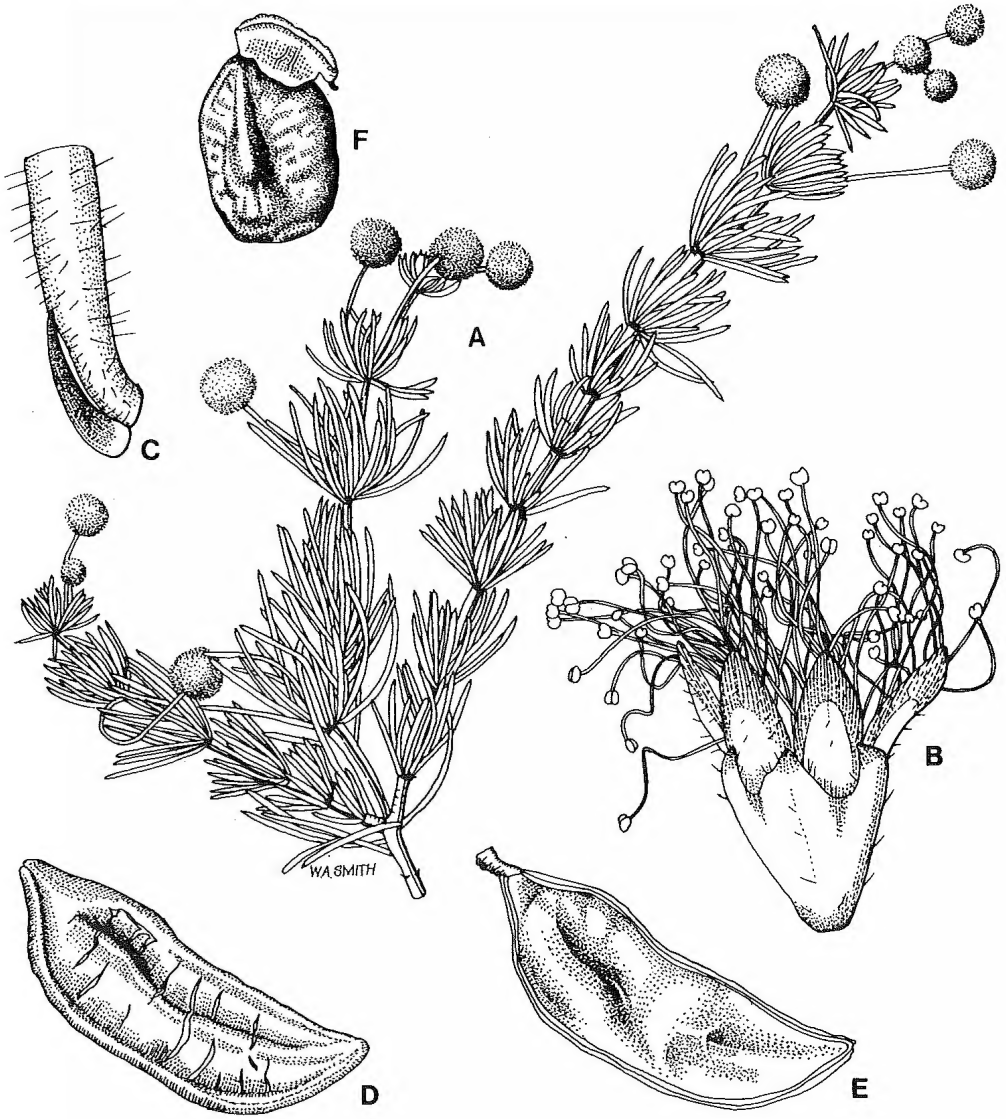

Fig. 1. *Acacia porcata*: A. habit × 1. B. flower × 10. C. stipule at base of phyllode whorl × 20. D. external view of pod showing longitudinal ridge × 2. E. internal view of pod × 2. F. seed × 5. A–D, Forster 4673 & Wilkinson; E, F, Forster 4827.

Acknowledgements

Mr C. G. Wilkinson, Queensland National Parks and Wildlife Service provided transport and company during the trip on which *A. porcata* was discovered. Mr L. Pedley (BRI) provided comments on the manuscript and the Latin diagnosis. Mr W. Smith (BRI) provided Figure 1.

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Accepted for publication 15 May 1989

Austrobaileya 3(2): 265–271 (1990)

NOTES ON *LEUCOPOGON* R. BR. (EPACRIDACEAE) IN QUEENSLAND

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Summary

Leucopogon blakei*, *L. grandiflorus*, *L. lavarackii*, *L. spathaceus **and** ***L. yorkensis*** **are described as new. All are confined to Queensland.** ***L. malayanus*** **subsp.** ***novoguineensis*** **is a new combination based on** ***Styphelia malayana*** **var.** ***novoguineensis*** **Sleumer, for a taxon from north-eastern Queensland.**

Work in progress on the classification of Epacridaceae (Powell *et al.* 1987) suggests that *Leucopogon* will be divided into at least two genera. However, work now well advanced on a census of the plants of Cape York Peninsula and a map of the vegetation of the region demands that some widespread ecologically important species of this alliance have names. These species are described. At the same time I have taken the opportunity to describe one species already treated in the literature (sp. 2 of Stanley & Ross, 1986) and one strikingly distinct species from central Queensland.

Leucopogon blakei Pedley, **sp. nov.** inter species sectionis *Pleuranthi* Benth. affinis *L. attenuato* Cunn. et *L. conferto* Benth. foliis leviter concavis aliquantum recurvatis non nisi breviter mucronatis, bracteolis sepalisque valde fimbriatis differt. **Typus:** Queensland. LEICHHARDT DISTRICT: Carnarvon Range, August 1960, *Gittins* 371 (holo & iso: BRI).

Leucopogon sp. 2 in Stanley & Ross: Flora of South-eastern Queensland 2: 261 (1986).

Twiggy shrub to 75 cm tall, sometimes prostrate; young branches pubescent, hairs slightly retrorse, 0.1 mm long. Leaves sessile, angulo-obovate, 2–3.6 × 1–2 mm, 1.5–3.5 times as long as wide, mucronulate, slightly concave, somewhat recurved, smooth above, conspicuously veined and slightly pubescent beneath. Flowers white, solitary (with a small rudiment) in the axils of leaves borne on short lateral branches, almost sessile, bracts less than half as long as the bracteoles, bracteoles obtuse, strongly fimbriate, c. 1.5 mm long; sepals obtuse, strongly fimbriate, 2.8 mm long; corolla 3 mm long, tube 1.7 mm long, lobes with copious white beard similar to that of species of sect. *Perojoa*; anthers obtuse, c. 1 mm long; disc 5-lobed; style c. 1 mm long, stigma flattened laterally. Fruit narrowly ellipsoidal, c. 3 mm long, somewhat flattened at the apex with a persistent stout style, about as long as the calyx. **Fig. 1A,B,C.**

Specimens examined (all BRI): **Queensland.** LEICHHARDT DISTRICT: 1.5 km S of crest of Carnarvon Range on Rolleston–Injune road, Mar 1960, *Johnson* 1461; Injune–Rolleston road, 4.8 km N of third crossing of Dawson R., 25°20′S, 148°40′E, Aug 1977, *Williams* 77099; Carnarvon Range, 25°05′S, 148°15′E, Aug 1969, *Hockings* [AQ 252500]; ditto, without date, *May* 26; ditto, Aug 1961, *Gittins* 371 (TYPE). DARLING DOWNS DISTRICT: Great Dividing Range about 10 miles [16 km] W of Gurulmundi, May 1960, *Blake* 21278; SW corner of Barakula State Forest, Mar 1982, *Hando* 315; top of range at Waaje, NW Corner of Barakula State Forest, Oct 1981, *Hando* 288.

Distribution: On shallow soil usually overlying sandstone, in inland southern Queensland. **Map 2.**

Notes: Because of its slightly concave leaves, *L. blakei* could be included in series *Planifoliae* Benth., but it resembles species of the small series *Confertae* in the characters of the flowers and in leaf shape so closely that its relationships lie there. It differs from both *L. confertus* and *L. attenuatus* in having strongly fimbriate sepals.

Etymology: The species in named in honour of S.T. Blake (1910–1973), at his death Senior Botanist at the Queensland Herbarium, whose wide botanical interests included Epacridaceae.

Leucopogon grandiflorus Pedley, **sp. nov.** inter species sectionis *Pleuranthi* Benth. forsan affinis *P. alittii* F. Muell. (incola Australiae occidentalis) sed flore uno in quoque axilla et corolla (12–15 mm longa) longiore differt propter forman indumentum dispositioeinque foliorum ut videtur ascedit ad *L. rupicolam* C. White qui autem ovario bicellulari instructus et ergo ad seriem *Micranthae* ascribendus. **Typus:** Queensland. LEICHHARDT DISTRICT: Carnarvon Creek, August 1961, *Gittins* 337 (holo & iso: BRI).

Shrub to 2m tall; branchlets with moderately dense, soft, ± spreading hairs c. 0.5 mm long becoming curved and matted on older parts of the plant. Leaves oblong, 8–10 × c. 1.3 mm (leaves not flattened) tapering to a point, revolute, discolorous, puberulent above, with long, weak, spreading hairs beneath. Flowers white, solitary (with a small rudiment) in the axils of upper leaves, bracts c. 1mm long, bracteoles c. 2 mm long, concave, obtuse, shortly apiculate; sepals ovate, obtuse, 4.5 mm long; corolla 12–15 mm long, tube 8–9 mm long, lobes narrowly triangular, acute; staminal filaments attached to the middle of the anther; anther 1.7 mm long; disc with 5 prominent deltoid lobes (resembling a coronet); ovary 5-angled, 5-celled, somewhat elongate; style c. 10 mm long with prominent villous capitate stigma. Fruit globose when dry, c. 5 mm long. **Fig. 1D,E.**

Specimens examined (all BRI): **Queensland.** LEICHHARDT DISTRICT: Ridge N of Arch Creek, 'Early Storms' Holding, Sep 1974, *Gittins* 2767; top of Boolimba Bluff, Carnarvon National Park, 25°03′S, 148°13′E, May 1982, *Neldner & Thomas* 886; Carnarvon Creek, Aug 1961, *Gittins* 337; N of Injune, Moolayember, approx. 25°30′S, 148°30′E, Aug 1987, *Barry* [AQ437346].

Distribution: Restricted to Carnarvon National Park and vicinity, on shallow soils overlying sandstone. **Map 2.**

Notes: The species is a distinctive one with large corollas. One flower dissected was aberrant in having one stamen quite free from the corolla tube. *L. grandiflorus* appears to be most closely related to *L. rupicola* which, however, has a 2-celled ovary. The shape, indumentum and orientation of the leaves of the two are similar, though the flowers of *L. rupicola* are smaller. By virtue of their 2-celled ovaries *L. rupicola* and *L. margarodes* R. Br. are members of series *Micranthae* Benth. whereas *L. grandiflorus*, on account of its revolute leaves and 5-celled ovary, must be referred to series *Ericoideae.*

Etymology: From Latin, *grandi-*, large, and *-florus*, flowered; an allusion to the flowers of the species which are probably the largest in the genus.

Leucopogon lavarackii Pedley, **sp. nov.** affinis *L. leptospermoidis* R. Br. (sectionis *Pleuranthi* Benth) ramulis puberulentis floribus (corolla 5–6 mm longa) majoribus corollis tubis prope basin angustioribus, antheris infra medium affixis et fructibus luteis differt. **Typus:** Mt Tozer, June 1948, *Brass* 19026 (holo: BRI).

Much branched shrub to 3 m high, sometimes flowering when less than 30 cm. Branchlets with short (0.1 mm), soft, erect hairs sometimes extending to the base of the leaves. Leaves oblong, elliptic or oblanceolate, usually 11–15 × 2–3 mm, 4.5–5.5 times as long as wide, obtuse, mucronulate, convex or with slightly revolute margins, shiny above, glaucous and obviously veined beneath, Flowers 2–4 (and a terminal rudiment) in axillary spikes much shorter than the leaves, hairs of the inflorescence axis longer than those of the branchlets; bracts 0.7 mm long; bracteoles 1.2–1.7 mm long, concave, obtuse, apiculate; sepals subacute, 3–4 mm long, shorter than the corolla tube; corolla 5–6 mm long, the tube one-third to half the total length; anthers c. 1 mm long, attached to filament in their lower halves; disc truncate, easily separated into lobes; ovary ovoid, 5-celled, sometimes distinctly 5-angled; style c. 3 mm long with a prominent peltate stigma. Fruits ellipsoidal, orange-yellow, as long as, or slightly longer than the calyx. **Fig. 2E,F,G.**

Specimens examined: Queensland. COOK DISTRICT: W of Captain Billy Landing [approx. 11°30′S, 142°00′E], Aug 1973, *Lavarack* 2515 (BRI,K); 10 miles [16 km] NE of Iron Range, Apr 1944, *Flecker* in N.Q. Nat. Club No. 8702 (BRI); Iron Range, Jun 1948, *Brass* 19272 (BRI); Tozer Gap, Tozer Range, Jul 1948, *Brass* 19427 (BRI); ditto, Feb 1980, *Clarkson* 2917 (BRI,K,MO,NT,PERTH); Mt Tozer, Jun 1948, *Brass* 19026 (BRI, TYPE); between Gordon & Scrub Hen Creeks, 12°40′S, 143°20′S, *Hyland* 7822 (BRI,QRS); c. 8 km S of Portland Roads, 12°39′S, 143°23′E, Jan 1982, *Barlow* 3722 (BRI,CANB); 10 km S of 'Merapah' homestead, Oct 1982, *Clarkson* 4580 (BRI,MBA); 3.5 km N of upper crossing of Massey Creek on 'Silver Plains' Station, 13°53′S, 143°31′E, Nov 1980, *Clarkson* 3634 (BRI,K,MBA,NSW,NT,PERTH,QRS); 5 miles [8 km] N of Hopevale Mission, 15°14′S, 145°07′E, Sep 1970, *Gittins* 2193 (BRI); Isabella Falls, 23.5 km E of Normanby River on Laura–Cooktown road, 15°17′S, 145°–′E, Jun 1985, *Clarkson* 5959 (BRI,CANB,DNA,K,L,MBA,MO,NSW,PERTH,QRS).

Distribution: On sand, sometimes seasonally waterlogged, on the eastern side of Cape York Peninsula north of Cooktown and recorded also on shallow rocky soil near Cooktown and WNW of Coen. **Map 1.**

Notes: Though sometimes confused in the field with *L. ruscifolius* R. Br. with which it sometimes occurs, *L. lavarackii* is most closely allied to *L. leptospermoides*. It differs in having puberulent rather than pubescent branchlets, larger flowers more narrowly constricted at the base, anthers attached to the filament above, not below, the middle and yellow fruits. *L. ruscifolius* has elliptic to obovate leaves 4 mm or more wide, flowers about the same size as those of *L. leptospermoides* and whitish fruits.

Etymology: The species is named for Dr P.S. Lavarack who has a long-standing interest in the vegetation of Cape York Peninsula.

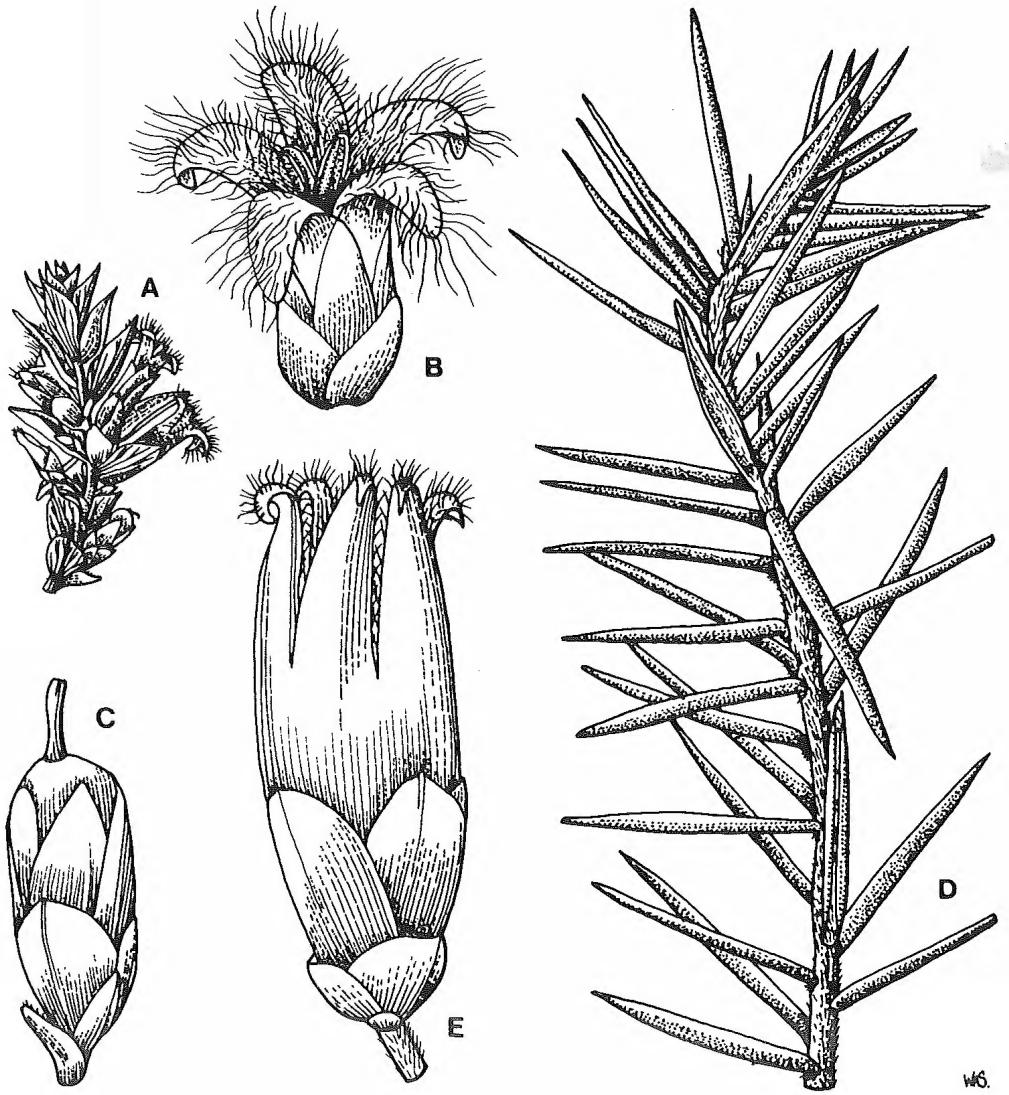


Fig. 1. *Leucopogon blakei*: A. twig × 3. B. flower × 12. C. fruit × 12. *Leucopogon grandiflorus*: D. twig × 3. E. flower × 6.

Leucopogon spathaceus Pedley, **sp. nov.** affinis *L. pluriloculato* F. Muell. et *L. pleiospermo* (F. Muell.) Benth. (sectionis *Heteranthesis* Benth.), ab amobus foliis ± planis et ab hoc floribus grandioribus (corolla 3–4 mm longa), disco lobato differt. **Typus:** Queensland. COOK DISTRICT: Davies Creek area, January 1962, *L.J. Webb & J.G. Tracey* 5652 (holo: BRI; iso: K,MO,NSW).

Shrub to 2 m tall; branches with loose white, moderately dense, antrorsely ascending or appressed hairs 0.3 mm long. Leaves oblong, 13–20 × 2.4–4 mm, 3–8 times as long as wide, produced into a pungent point, flat or slightly concave, glabrous, veins conspicuous beneath, petiole c. 1 mm long. Flowers in a 2–5-flowered raceme, terminal or occasionally in axils of upper leaves, enclosed when young within imbricate scale leaves; bract and bracteole at base of pedicel c. 1 mm long; pedicel shorter than bracts and bracteoles; sepals ovate, 1.5–2 mm long, subacute; corolla 3–4 mm long, the tube c. 1.5 mm long; anthers 1–1.2 mm long, attached to the filament at the top; disc obtusely lobed; ovary 6- or 7-celled, style c. 1 mm long. Fruit creamy yellow, subglobose, c. 3 mm diameter. **Fig. 2A,B.**

Specimens examined: Queensland. COOK DISTRICT: Thornton Peak, 16°10′S, 145°20′E, alt. 1260 m, Nov 1973, *Stocker* 1088 (BRI,QRS); SFR143, North Mary L.A., 16°32′S, 145°16′E, alt. 1000m, May 1979, *Hyland* 9792 (BRI,QRS); S.F.R. 185, Edith L.A., 17°05′S, 145°35′E, alt. 1160 m, Apr 1974, *Irvine* 820 (BRI,QRS); ditto, 17°10′S, 145°35′E, alt. 1000 m, Feb 1972, *Dockrill & Stevens* 820 (BRI,QRS); Davies Creek area, Jan 1962, *Webb & Tracey* 5652 (TYPE: BRI,K,MO,NSW); ridge S of Tinaroo Creek road, 14 miles [22 km] from Mareeba, alt. 900 m, May 1962, *McKee* 9450 (BRI); Tinaroo Creek Forestry Reserve, 17°05′S, 145°36′E, Nov 1979, *Clarkson* 2721 (BRI,K,MBA,MO,NSW,QRS); E of Mareeba, 17°06′S, 143°35′E, alt. 1100 m, May 1983, *de Campo* 20 (BRI,MBA,QRS); Gadgarra, 17°17′S, 145°39′E, Sep 1959, *Smith* 10825 (BRI); S.F.R. 41, near Atherton, Dec 1952, *White* in *QFD 52/232* (BRI); Whelanian Pools, Meston's Bellenden Ker Expedition, in 1889, *Bailey* [AQ478119] (BRI); Mt Mulligan, 16°52′S, 144°51′E, Apr 1985, *Clarkson* 5768 (BRI,MBA,MEL,NSW,QRS). NORTH KENNEDY DISTRICT: c. 38–40 km S of Ravenshoe, Dec 1977, *Lockyer* 123A (BRI); ditto Mar 1978, *Lockyer* 123B (BRI).

Distribution: In rainforest and eucalypt communities on coastal ranges in the Cairns hinterland. **Map 1.**

Notes: The 6- or 7-celled ovary of *L. spathaceus* suggests affinities with *L. pluriloculatus* and *L. pleiospermus* (sect. *Heteranthesis*). It differs from both in having ± flat leaves not concave or with revolute margins, and from *L. pleiospermus* in having larger flowers with a lobed disc. The distribution and ecological niches of *L. spathaceus* differ markedly from those of the other two.

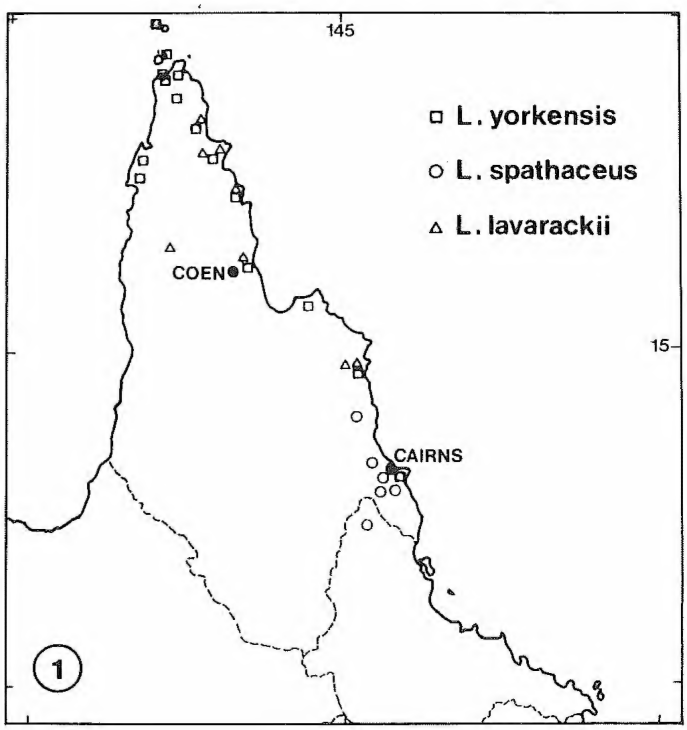
Etymology: From Latin *spathaceus*, having the appearance of a spathe, an allusion to the scale leaves that enclose the developing racemes.

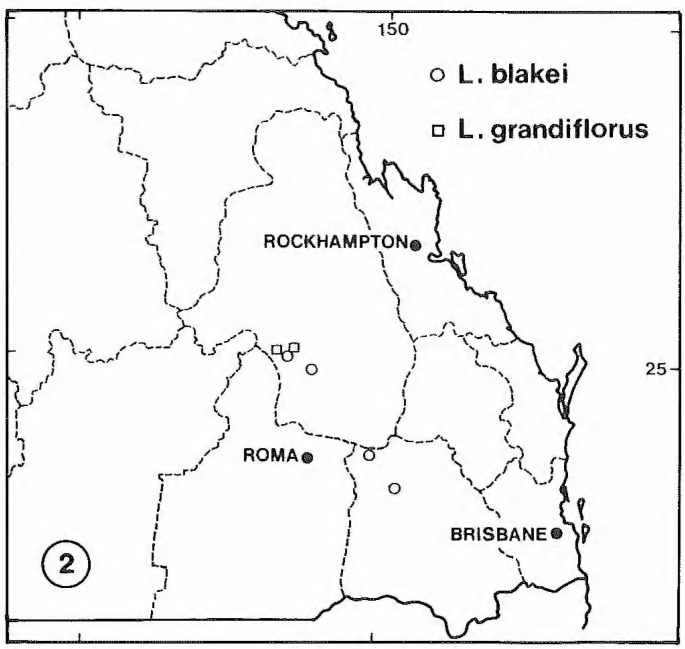
Leucopogon yorkensis Pedley, **sp. nov.** affinis *L. leptospermoidis* R. Br. (sectionis *Pleuranthi* Benth.) abore ramulis pilis patentibus obtectis, spicis ex 3–12 floribus constantibus et fructibus translucentibus albis differt. **Typus:** *Clarkson* 2940 (holo: BRI; iso: CANB,MEL,MO,NSW,NT,PERTH, PR,QRS).

Shrub or tree to 10 m tall, bark brown fibrous (*fide* Brass), hard and fissured *fide* Hyland); branchlets with soft erect hairs 0.2–0.4 mm long, shorter sometimes on bases of leaves. Dormant shoots up to 2.5 cm long, sheathed in imbricate bud scales 3–4 mm diameter. Leaves oblanceolate, obovate or spathulate when short, 5–12 × 1.5–3 mm, usually 2–5 times as long as wide, acute or obtuse with a callous point, not mucronulate, flat or slightly concave, shiny above, somewhat glaucous and veined beneath. Flowers 3–12 in spikes, shorter than the leaves in the upper axils; bracts 0.3–0.5 mm long; bracteoles concave, keeled, obtuse, pubescent on back, 0.7–0.9 mm long; sepals ovate, obtuse, pubescent 1.2–1.6 mm long, longer than the corolla tube; corolla c. 2.5 mm long, the tube c. 0.8 mm; staminal filaments attached to the top of anther; anther 0.7–0.9 mm long, as long as free part of filament; disc truncate, entire; ovary ovoid sometimes pubescent on top, 2-celled, 5-angled; style 1 mm long; stigma small, capitate. Fruit translucent, white, globose, described as 3–6 mm long when fresh, drying to c. 2.5 mm diameter. **Fig. 2C,D.**

Selected Specimens: Queensland. COOK DISTRICT: Badu Is., 10°07′S, 142°09′E, Aug 1979, *Garnett* 114 (BRI); ditto, Oct 1981, *Clarkson* 4005, 4009 & 4019 (BRI,DNA,K,MBA,MO,NSW,PERTH,QRS); Horn Is., Jul 1943, *Tyack Bake* (BRI); Cape York, Jun 1961, *Volk* 1948 in *QFD* 62/54 (BRI); between C. York and Galloways Hill, Oct 1965, *Smith* 12543 (BRI); Cody Creek, 13 miles [21 km] WSW of Somerset, Apr 1948, *Brass* 18514 & 18527 (BRI); Newcastle Bay, May 1948, *Brass* 18770 (BRI); Bamaga district, May 1962, *Webb & Tracey* 6039

Fig. 2. *Leucopogon spathaceus*: A. twig × 3. B. flower × 8. *Leucopogon yorkensis*: C. twig × 3. D. flower × 8. *Leucopogon lavarackii*: E. twig × 3. F. flower × 8. G. fruit × 8.





Maps 1–2. Distribution of *Leucopogon* spp.

(BRI,MEL,NSW); near road crossing of Jardine River, Aug 1973, *Lavarack* 2575 (BRI); Weipa, Jul 1981, *Morton* AM1293 (BRI,MEL); S of Pennefather River mouth, 12°17′S, 141°42′E, Aug 1983, *Clarkson* 4921 (BRI,K,NSW,PERTH,QRS); Olive River, 12°10′S, 143°05′E, Sep 1974, *Hyland* 7443 (BRI,QRS); Restoration Beach, 5 km SW of Cape Weymouth, 12°39′S, 143°24′E, Feb 1980, *Clarkson* 2940 (TYPE); ditto, Jan 1982, *Barlow* 3722 (BRI,CANB); between 'Silver Plains' Station and Rocky River, 5 miles [8 km] N of Massey Creek, approx. 13°50′S, 143°29′E, Oct 1969, *Webb & Tracey* 9729A (BRI); 2 km N of Massey Creek crossing, 'Silver Plains', Nov 1980, *Clarkson* 3620 (BRI,MBA,QRS); Bathurst Bay, 14°25′S, 144°30′E, Jul 1972, *Hyland* 6319 (BRI,QRS); near foot of Melville Range, S of Bathurst Bay, Jul 1972, *Lavarack* 1679 (BRI); 6.2 km E of Hopevale–'Starke' road on track to McIvor River mouth, 15°04′S, 145°10′E, Jun 1984, *Clarkson* 5336 (BRI,DNA,NSW,PERTH); W of Walker Point, S of Cooktown, Jun 1973, *Lavarack* 2132 (BRI); Aboriginal Reserve 204, Trinity, 16°55′S, 145°55′E, Oct 1975, *Hyland* 8515 (BRI,QRS); Yarrabah, in 1918, *Michael* 630 (BRI).

Distribution: On sand, often in pure stands and with *Asteromyrtus symphocarpa* (F. Muell.) Craven in the lee of beach dunes and in various communities ranging from eucalypt woodland to evergreen vine thicket, on islands of Torres Strait, and northern and eastern Cape York Peninsula to Cooktown with an isolated occurrence at Yarrabah (Aboriginal Res. 204) near Cairns. Despite its widespread occurrence and commonness in Cape York Pensinsula, *L. yorkensis* is apparently absent from New Guinea. All specimens of *Leucopogon* seen from New Guinea have been from mountains. **Map 1.**

Notes: *L. yorkensis* is related to *L. leptospermoides* but grows to tree size, has spreading hairs on the branchlets and has spikes of 3–12 flowers. Its fruits are translucent white.

Etymology: The species is so named because of its occurrence in many plant communities on Cape York Peninsula.

Leucopogon malayanus Jack subsp. **novoguineensis** (Sleumer) Pedley, **comb. & stat. nov.**

Styphelia malayana var. *novoguineensis* Sleumer, Blumea 12: 148 (1963). **Type:** New Guinea: Cycloop Mts, S slope of the Makanoi Ra., above Kotanica, 600–700 m, July 1961, *van Royen & Sleumer* 6200 (*n.v.*).

Specimens examined: Queensland. COOK DISTRICT: Platypus Creek at head of Mossman River, 16°26′S, 145°15′E, alt. 1100 m, Sep 1972, *Tracey* 14891 (BRI,QRS); Timbercamp Creek on road between Daintree and Bloomfield R., 16°1–′S, 145°20′E, alt. 200 m, Aug 1972, *Webb & Tracey* 12145 (BRI,CANB).

Notes: Sleumer, who treated *Leucopogon* as a subgenus of *Styphelia*, recorded this taxon from the Cycloop Mountains in western New Guinea (approx. 2°30′S, 140°45′E) above 600 m alt. Transfer of the varietal epithet to *Leucopogon* is required. Since the taxon is clearly distinguished from *L. malayanus* subsp. *malayanus* by the long hairs on the top of the ovary and base of the style and since there is also a substantial disjunction in the ranges of the two taxa, subspecific rank is therefore considered appropriate.

Acknowledgements

I am grateful to Dr P.S. Lavarack, of the Queensland National Parks and Wildlife Service, for good collections of *Leucopogon* from Cape York Peninsula which aroused my interest in the problems in the area, and to Mr J.R. Clarkson (MBA) for many fine copious collections in more recent years, and to Mr W.A. Smith (BRI) who prepared the illustrations and the maps.

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Accepted for publication 30 March 1990

Austrobaileya 3(2): 273–289 (1990)

NOTES ON ASCLEPIADACEAE, 2

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Summary

The genus *Cryptolepis* R. Br. is recircumscribed to include *Gymnolaema* Benth., *Stomatostemma* N.E. Br., *Batesanthus* N.E. Br. and *Streptomanes* Schumann. New combinations in *Cryptolepis* for African taxa are *C. pendulina* (Venter & D.V. Field) P. Forster, *C. purpureus* (N.E. Br.) P. Forster and *C. newii* (Benth.) P. Forster. *Cryptolepis* is recorded for Australia with *C. grayi* P. Forster, sp. nov. and for New Guinea with *C. nymanii* (Schumann) P. Forster, comb. nov. and *C. papillata* P. Forster, sp. nov. *Gunnessia pepo* P. Forster gen. et sp. nov. is described from north Queensland. Its position within the Asclepiadaceae is discussed. *Marsdenia papuana* Schltr. and *M. klossii* S. Moore are placed in the synonymy of *M. velutina* R. Br. *Tylophora perlaxa* Schltr. is placed in the synonymy of *T. flexuosa* R. Br. Lectotypes are selected for *Marsdenia velutina* and *Tylophora flexuosa* both of which are newly recorded for New Guinea. The new combination *Dischidia torricellensis* (Schltr.) P. Forster based on *Spathidolepis torricellensis* is made.

Contents

Introduction

This is the second in a series of papers to address some of the nomenclatural and taxonomic problems pertaining to the Asclepiadaceae of Australia, Papuasia and Melanesia, prior to taxonomic revisions of the larger genera such as *Tylophora* R. Br. and *Marsdenia* R. Br. In particular, attention is directed to several of the taxa described from the region by Rudolf Schlechter. Schlechter published a great many new names in Asclepiadaceae with a significant number from New Guinea where he undertook extensive field collections in the early 20th century (Loesener 1926). Unfortunately apart from *Hoya* R. Br. and *Dischidia* R. Br., the majority of his types deposited in B were destroyed during the Second World War and as yet the extent of duplicates in other herbaria has not been determined. The loss of the Berlin types is particularly tragic as in many cases (at least for *Hoya* names), Schlechter had appended a set of floral sketches to the specimens. Some of these were later reworked and included in a number of his papers (e.g. Schlechter 1914).

Schlechter described many new taxa, however he tended to base many of these on trivial differences. Hence as research progresses in groups where he described taxa, many of these taxa have been found to be conspecific with more widespread variable taxa (e.g. Rintz 1980).

In the collections cited, those with an asterisk are represented by material preserved in spirit at the herbaria indicated. Where unsighted duplicates have been listed on labels I have listed these as *n.v.* to facilitate curation at other institutions.

1. *CRYPTOLEPIS*

Cryptolepis R. Br. has been traditionally regarded as a small genus in the subfamily Periplocoideae with perhaps no more than a dozen species in tropical Asia and Africa (Bullock 1955). Genera recognised for the African continent that are closely allied to *Cryptolepis* include *Batesanthus* N.E. Br., *Gymnolaema* Benth. and *Stomatostemma* N.E. Br. Many of these small or monotypic genera appear to have been defined on relatively minor characters such as coronal lobe variation and the degree of development of the corolla tube. *Gymnolaema* was considered by Brown (1904) to differ from *Cryptolepis* only in the "very minute coronal-lobes adnate to the filaments of the stamens". *Stomatostemma* was differentiated from *Cryptolepis* by Brown on the basis of the position of the coronal-lobes, these being at the sinuses of adjacent petals in *Stomatostemma* in comparison to further down the corolla tube in *Cryptolepis s. str. Batesanthus* was allied by Brown to *Chlorocodon* J.D. Hook., and differed from *Cryptolepis* by lacking coronal lobes and possessing an annulus next to the staminal filaments. A further genus allied to *Cryptolepis* was described by Schumann (1905) as *Streptomanes* based on material collected in New Guinea. Schumann did not note the close relationship of *Streptomanes s. str.* with *Cryptolepis s. str.* and instead allied *Streptomanes* to *Periploca* L. from which he considered it differed in the glabrous anthers, the deeply cleft corona adnate to the corolla and the awl-like anther appendages.

Recognition that two undescribed species of Periplocoideae occur in north Queensland or New Guinea and difficulty in determining their correct generic placement led to an examination of the various genera closely allied to *Cryptolepis*. Characters such as those listed above, have been used for separating species or sections in other subfamilies of the Asclepiadaceae. Consequently they are not regarded as being particularly useful in the definition of genera within the Periplocoideae.

Therefore, the generic concept of *Cryptolepis* has been redefined in this account to include those taxa in Periplocoideae that have salverform, campanulate or rotate corollas with or without coronal lobes of varying length that are not directly fused to the staminal filaments. Such a broader concept is necessary as there is an obvious gradation from species possessing separate subulate coronal lobes in the sinuses between adjacent petals, as in species included in *Stomatostemma* (see Venter & Field 1989), to those with small rounded coronal lobes in the corolla throat (species included in *Cryptolepis s. str.*, e.g. *C. javanica* (Blume) Blume, (Blume 1850)), to those completely lacking coronal lobes, but having some form of corolline corona, either in the form of an annulus (e.g. *C. papillata*) or minor lobing around the base of the filaments (e.g. *C. grayi*). A complete review of generic concepts in this subfamily should be undertaken before an infrageneric classification of *Cryptolepis* based on this morphological variation is proposed.

This redefinition of the generic concept of *Cryptolepis* results in the placing of the generic names *Gymnolaema*, *Streptomanes*, *Stomatostemma* and *Batesanthus* in synonymy with it. Other genera that may also be synonymous include *Perithryx* Pierre, *Sacleuxia* Baillon and *Macropelma* Schumann. As I have not seen material or illustrations of the taxa concerned, they are not considered further in this account.

Cryptolepis R. Br., Asclepiadeae 58 (1810). **Type**: *C. buchananii* Roemer & Schultes
R. Br., Mem. Wern. Nat. Hist. Soc. 1: 69 (1811); Benth. in Benth. & J.D. Hook., Gen. pl. 2: 740 (1876); J.D. Hook., Fl. Brit. India 4: 5–6 (1885); Bruce, Kew Bull. 1946: 46–48 (1946); Bullock, Kew Bull. 1955: 279–282 (1955); Backer & Bakhuizen van den Brink, Fl. Java 3: 250 (1965); Ali, Fl. Pakistan 150: 54–55 (1981).

Leposma Blume, Bijdr. 1049 (1826–27). **Type**: *L. javanicum* Blume

Lepistoma Blume, Fl. Javae 7 (1828). **Type**: as for *Leposma*
Decne. in DC., Prodr. 8: 497 (1844).

Ectadiopsis Benth. in Benth. & J.D. Hook., Gen. pl. 2: 741 (1876). **Type**: *Ectadium oblongifolium* Meissner (= *Ectadiopsis oblongifolia* (Meissner) Schltr.), (lectotype designated by Bullock).
Bullock, Kew Bull. 1955: 267–279 (1955).

Gymnolaema Benth. in Benth. & J.D. Hook., Gen. pl. 2: 740 (1876), **synon. nov. Type**: *G. newii* Benth.
N.E. Br. in Dyer, Fl. trop. Afr. 4(1): 241 (1904).

Batesanthus N.E. Br. in J.D. Hook., Icon. pl. t. 2500 (1896), **synon. nov. Type**: *B. purpureus* N.E. Br.
N.E. Br. in Dyer, Fl. trop. Afr. 4(1): 253–254 (1904).

Stomatostemma N.E. Br. in Dyer, Fl. trop. Afr. 4(1): 252 (1904), **synon. nov. Type**: *Cryptolepis monteiroae* N.E. Br. (= *Stomatostemma monteiroae* (Oliver) N.E. Br.)

Streptomanes Schumann in Schumann & Lauterb., Nachträge Fl. Schutzgeb. Südsee 352 (1905), **synon. nov. Type**: *S. nymanii* Schumann

Perennial shrubs, lianes or scramblers with white latex, often glabrous; indumentum sparse if present. Small stipules at each node. Leaves opposite, petiolate; lamina linear-lanceolate, lanceolate, ovate, elliptic or oblong; petiole grooved; extrafloral nectaries absent at lamina base. Inflorescence a much branched, extra-axillary cyme bearing 1–many fascicles of 1–many flowers. Flowers salver-shaped, campanulate or rotate. Sepals usually with basal glands. Corolla tube cylindric-urceolate; petals 5, often dextrorse in bud, patent at anthesis. Corolline corona comprising 5 free lobes opposite the sinuses of adjacent petals or at the top of the corolla tube, or forming a collar around the filament bases or an annulus on the corolla tube. Staminal corona absent. Stamens 5, inserted slightly above the corolla tube base, alternate with the petals, connate or closely adnate at base, free for most of length. Anthers dehiscing longitudinally, with apical appendages which are sometimes elongated and twisted together. Translators spathulate. Pollen granular, organised in tetrads and loosely cohering into masses appressed against the broadened upper ends of the translators. Ovaries free, glabrous. Style-head conical, pentagonal in transverse section. Follicle widely divaricate, fusiform to fusiform-ovoid, smooth; seeds comose.

10–20 species in Africa, Asia, Malesia and Australia.

Cryptolepis has not been recorded for Australia or New Guinea previously. Australia has one endemic species and New Guinea has two. It is the third native genus in the subfamily Periplocoideae to be recognised for the region. The other genera are *Finlaysonia* Wallich (Forster 1989) and *Gymnanthera* R. Br.

Key to species of *Cryptolepis* in New Guinea

1. Lamina elliptic to ovate, secondary vein pairs in lamina 11–13; corolla not papillate . . . . . **1. C. nymanii**

   Lamina lanceolate, secondary vein pairs in lamina 27–30; corolla papillate . . . . . **2. C. papillata**

1. Cryptolepis nymanii (Schumann) P. Forster **comb. nov.**

Streptomanes nymanii Schumann in Schumann & Lauterb., Nachträge Fl. Schutzgeb. Südsee 352 (1905). **Type**: Stephansort, Kaiser-Wilhelmsland, *Nyman* 1020 (iso: UPS!).

Woody liane with white latex. Stems cylindric, to several metres long, to 4 mm diameter, glabrous; internode length variable to 18 cm. Leaves petiolate, glabrous; lamina elliptic to ovate, up to 13 cm long and 8 cm wide, dark glossy green adaxially, light green abaxially, base rounded, tip acuminate, with 11–13 secondary vein pairs prominent below; petiole grooved on top, up to 30 mm long and 1 mm diameter. Cymes borne on top 2–5 nodes. Cymes much branched with many fascicles, up to 11 cm long and 13 cm wide; each fascicle 1–many-flowered; bracts lanceolate, c. 1 mm long and 0.25 mm wide, glabrous; peduncle 3–5 cm long, c. 2 mm diameter, glabrous. Flower rotate, c. 10 mm long and 12 mm diameter; pedicels 5–8 mm long, c. 0.25 mm diameter, glabrous. Sepals ovate, green, c. 2 mm long and 2 mm wide, glabrous and with usually 1 gland at base on adaxial surface. Petals c. 10 mm long, 2–2.5 mm wide, dextrorse in bud and at anthesis, lanceolate, glabrous, internally yellow to golden brown or orange, externally greenish white. Corolline corona of 5 separate bifid lobes; each lobe c. 0.75 mm long and 0.75 mm wide, fused to base of anther filament. Filaments each c. 0.25 mm long

and 0.2 mm wide. Anthers incurved over top of style-head and intertwined but not fused to each other, c. 1 mm long and 0.5 mm wide, ending in a lanceolate appendage c. 0.75 mm long. Style-head c. 0.25 mm long and 1 mm diameter, on style c. 0.75 mm long and 0.25 diameter. Translators not seen. Pollen masses aggregated into groups c. 1 mm long and 0.25 mm wide; pollen tetrads globular, 0.08–0.1 mm diameter. Ovaries free, c. 1.5 mm long and 1.5 mm wide at base, glabrous. Follicles and seed not seen. **Figs 1 & 4.**

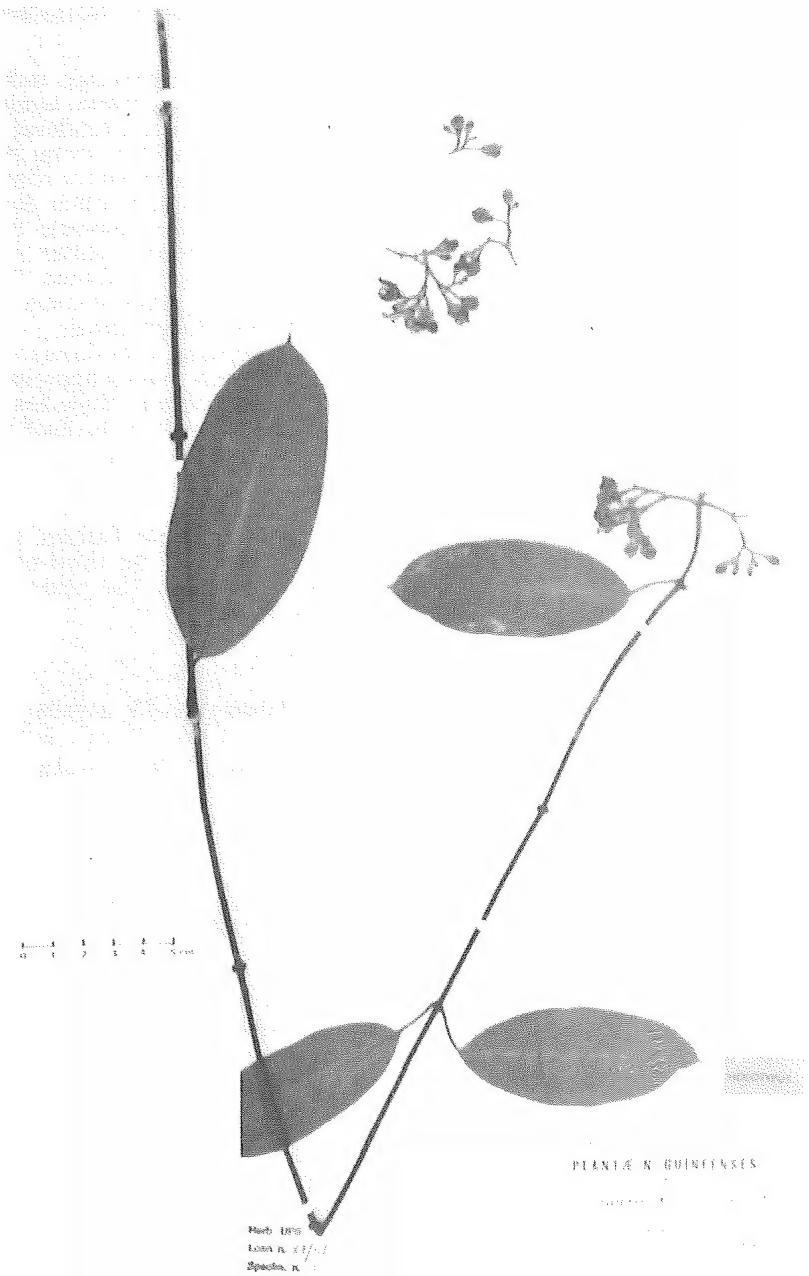

Fig. 1. Isotype of *Streptomanes nymanii* Schumann (Nyman 1020) at UPS.

Specimens examined. Papua New Guinea. MOROBE DISTRICT: McAdam Park, 4 miles [6.4 km] from Wau, 7°20′S, 146°45′E, Oct 1964, *Womersley* NGF19427 (BRI; A,BO,CANB,K,L,LAE,NSW,PNH,SING,UH *n.v.*); Taun Ck L.A., Bulolo, Oct 1965, *Streimann & Kairo* NGF21183 (BRI,L; A,BISH,BO,CANB, K,LAE,NSW,PNH, SING,UH,US *n.v.*); Below Dengalu Village, 7°10′S, 146°40′E, Jan 1964, *Millar* NGF23017 (BRI; L,LAE *n.v.*); Busu River, c. 13 miles [22 km] N of Lae, Jun 1963, *Hartley* 11926 (BRI; CANB *n.v.*). CENTRAL DISTRICT: on ridge below Boridi Village, 9°05′S, 147°38′E, Oct 1973, *Foreman & Vinas* LAE60241 (BRI; A,CANB,L,LAE *n.v.*).

Distribution and habitat: Known only from the Morobe and Central Districts of Papua New Guinea (**Map 1**), where it has been recorded from montane forest dominated by *Castanopsis* sp. at altitudes 1000–1400 m.

Phenology: Flowers have been recorded throughout the year.

Notes: While the original set of Nyman's collections is at UPS, the material of *Nyman* 1020 at that institution is designated as an isotype as Schlechter's holotypes were usually deposited at B. No material is extant at B.

Conservation status: Not ascertained.

Ethnobotanical use: Millar notes on the label for NGF23017 that the local name among people of the Patep-Buangs dialect was 'Teta'. They used the stems for making rope.

2. Cryptolepis papillata P. Forster, **sp. nov.** affinis *C. nymanii* (Schumann) P. Forster a qua foliis lanceolatis venatione obscura, utroque costae 27–30 venis secundariis praeditis, petalis triangularibus papillatis 4–5 mm longis et c. 6 mm latis, corona corollina annulum papillatum c. 4 mm diam. faciente, differt. **Typus**: Partep Ck, Lae–Wau road, Bulolo Valley, Morobe District, Papua New Guinea, November 1955, *Womersley* NGF7821 (holo: BRI; iso: LAE *n.v.*).

Woody liane with white latex. Stems cylindrical, to 2 mm diameter, glabrous; internodes variable in length to 4 cm long. Leaves petiolate, glabrous; lamina lanceolate, up to 13 cm long and 4 cm wide; tip acuminate; base cuneate; midrib sunken above; secondary veins 27–30 on each side of and at 90° to the midrib and obscure above and below; petiole grooved above, up to 7 mm long and 1 mm diameter, glabrous. Cymes borne on uppermost 2–5 nodes. Cyme up to 2 cm long and wide, comprising 2–3 fascicles; each fascicle with up to 5 flowers; bracts lanceolate, c. 1 mm long and 0.5 mm wide, glabrous; peduncle cylindrical, c. 4 mm long and 1 mm diameter, glabrous. Flower rotate, c. 5 mm long and 12 mm diameter; pedicels 3–4 mm long and c. 1 mm diameter, glabrous. Sepals ovate, c. 2 mm long and 1.5 mm wide, glabrous and lacking glands at base. Corolla reddish orange, gold or orange-brown internally; tube c. 7 mm diameter and 4 mm long; petals triangular, 4–5 mm long and c. 6 mm wide, externally glabrous, internally papillate. Corolline corona consisting of a c. 4 mm diameter raised annulus of shortly papillate tissue around the filaments. Staminal column c. 2 mm long and 1.5 diameter. Filaments c. 1 mm long and 0.25 mm wide. Anthers connivent on style-head but not fused to it; each anther c. 1 mm long and 0.5 mm wide, appendage lanceolate-ovate, c. 0.5 mm long. Style-head c. 1 mm long and 1 mm diameter. Ovaries c. 1 mm long and 1 mm wide, glabrous. Translator spathulate, 0.7–0.85 mm long, 0.2–0.3 mm wide at the end with pollen, c. 0.05 mm wide at non-pollen bearing end. Pollen tetrads ovoid, c. 0.04 mm long and 0.03 mm wide. Follicles and seed not seen. **Fig. 2.**

Specimens examined. Papua New Guinea. MOROBE DISTRICT: Partep, Wau–Lae road, Oct 1961, *Womersley* [AQ217386] (BRI); Patep River, 7°00′S, 146°40′E, Dec 1961, *Millar* NGF13878 (BRI; LAE *n.v.*); Patep Ck, 7°00′S, 146°35′E, Jan 1964, *Millar* NGF18876 (BRI; CANB,L,LAE *n.v.*).

Distribution and habitat: *C. papillata* is known only from Partep Ck area in the Morobe District of Papua New Guinea (**Map 1**) where it has been collected growing over trees on the creek banks.

Phenology: Flowers have been recorded from October to January, fruiting probably occurs 2–3 months later.

Notes: The papillate corolla, corolline corona forming an annulus and the obscurely veined leaves of this species are its most distinctive features.

Conservation status: Not ascertained.

Etymology: Named for the papillate nature of the corolla.

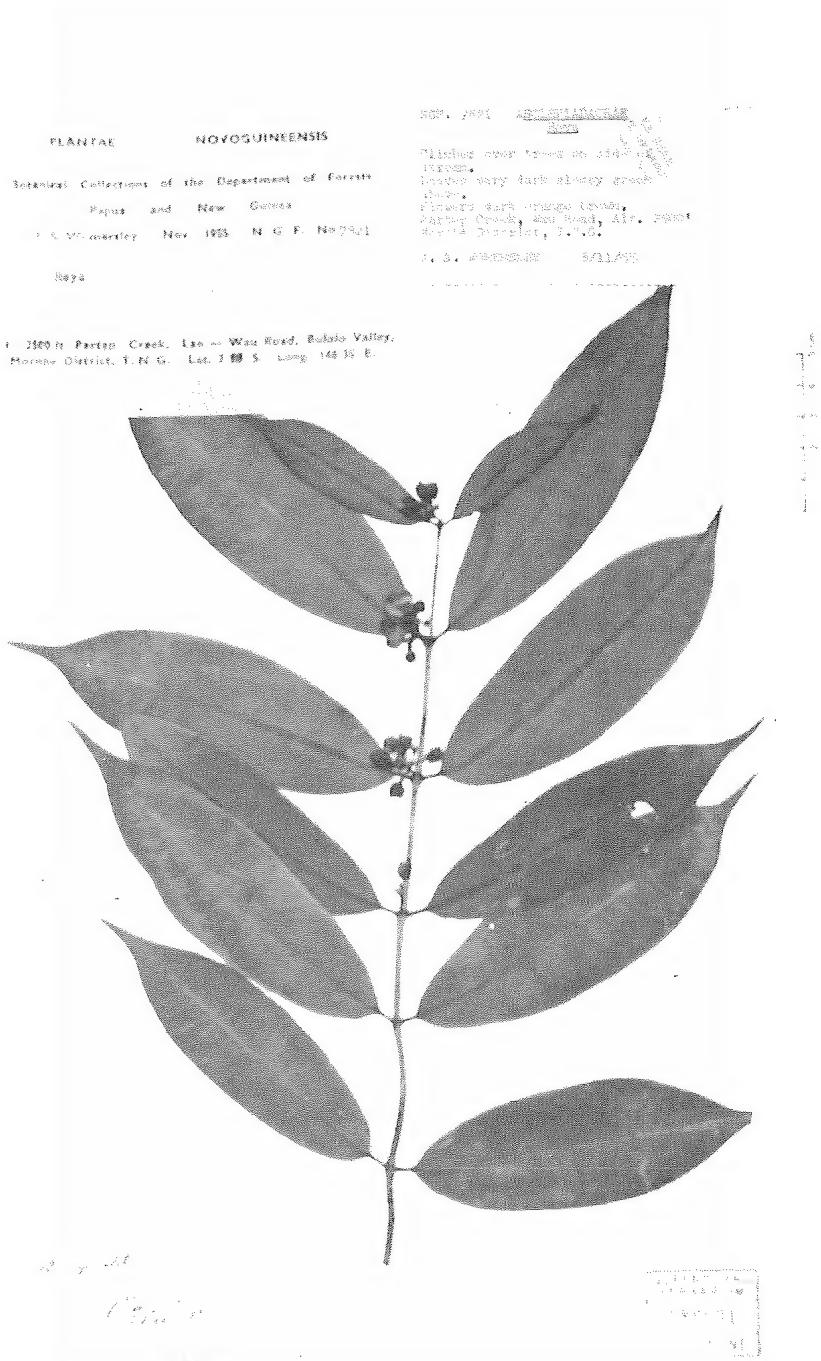

Fig. 2. Holotype of *Cryptolepis papillata* P. Forster (Womersley NGF7821) at BRI.

Cryptolepis in Australia

Cryptolepis grayi P. Forster **sp. nov.** affinis *C. nymanii* (Schumann) P. Forster, a qua foliorum utroque costae 13–15 venis secundariis, corolla marronina, petalis c. 12 mm longis, c. 4 mm latis, corona corollina lobis 5 bifidis et collum circa basem styli faciente, antheris appendicibus elongatis usque 1 mm longis, filamentis c. 3.5 mm longis et 0.5 mm diam., stylo elongato usque 2 mm longo, differt. **Typus**: Tolga Scrub, 17°14′S, 145°28′E, 9 November 1979, *B. Gray* 1561 (holo: QRS; iso: BRI).

Woody liane with white latex. Stems cylindrical, to several metres long, to 5 mm diameter, deep green ageing grey, glabrous; internode length variable to 15 cm. Leaves petiolate, glabrous; lamina elliptic-oblong, up to 15 cm long and 5 cm wide, base cuneate, tip acute to acuminate, with 13–15 secondary vein pairs prominent below, dark glossy green above, paler grey-green below; petiole 10–25 mm long and c. 1 mm diameter. Cymes borne on uppermost 2–5 nodes. Cymes much branched, to 15 cm long and 15 cm wide; fascicles with 1–many flowers; bracts linear-lanceolate, c. 2 mm long, 0.5–1 mm wide, glabrous; peduncle up to 6 cm long and 2 mm diameter, green, glabrous. Flower rotate, c. 15 mm long and 25 mm diameter; pedicels 7–8 mm long, c. 1 mm diameter, green, glabrous. Sepals lanceolate, 3–4 mm long, 2–3 mm wide, glabrous and lacking glands at base. Corolla tube obsolete; petals dextrorse in bud and at anthesis, lanceolate, c. 12 mm long and 4 mm wide, glabrous, internally maroon, externally cream. Corolline corona consisting of raised tissue around the stamen filaments and style base, comprising 5 separate bifid lobes and a collar around the base of the style; each lobe c. 1.5 mm long and 2 mm wide, fused to base of stamen filament. Filaments fused to base of corolla and alternate with petals, each c. 3.5 mm long and 0.5 mm diameter. Anthers c. 2 mm long and 1.5 mm wide, curved in over top of style-head and intertwined but not fused to each other; ending in a lanceolate appendage c. 1 mm long. Staminal column c. 4 mm long and 3.5 mm diameter. Style-head c. 2 mm long and 3.5 mm diameter, on style c. 2 mm long and 2 mm diameter. Translators spathulate 2–2.25 mm long and 0.2–0.25 mm wide at end bearing pollen, stem 0.15–0.17 mm wide. Pollen masses aggregated into group c. 1–1.5 mm long and 0.5 mm wide; pollen tetrads globular, c. 0.25 mm diameter. Ovaries free, c. 3 mm long, c. 2 mm wide at base and 1.5 mm wide at top, glabrous. Follicle woody, ovoid-fusiform c. 90 mm long and 20 mm diameter, glabrous, tip slightly hooked. Seed oblong, brown, c. 6 mm long and 3 mm wide; coma attached to micropylar end of seed, white, c. 15 mm long. **Figs 3 & 4.**

Specimens examined. Queensland. COOK DISTRICT: Tolga Scrub, 17°14′S, 145°28′E, Mar 1979, *Gray* 20086V (QRS); ditto, Aug 1980, *Gray* 1778 (QRS); ditto, Feb 1980, *Gray* 1650 (QRS); ditto, Mar 1988, *Forster* 3849 (BRI).

Distribution and habitat: Known only from the Tolga Scrub near Atherton (**Map 1**) where it grows as a canopy liane in complex notophyll vine forest on a basaltic red earth (Tracey 1982).

Notes: The corolline corona forming a collar around the base of the style and the long filaments are the most distinctive features of this species. The large maroon flowers make this potentially a most attractive ornamental plant.

Conservation status: The particular class of complex notophyll vine forest in which this species grows was at one time more common on the Atherton Tableland, but has been almost completely cleared. The Tolga Scrub Environmental Park is a very small fragment and may not offer a viable long term reserve for this species. Conservation coding of 2E (after Briggs & Leigh 1988).

Etymology: Named for Bruce Gray of Atherton who discovered this plant and who collected flowering and fruiting material.

Table 1 presents the main characters by which *C. grayi*, *C. nymanii*, *C. papillata* and *C. buchananii* may be distinguished. The comparison with *C. buchananii* is made, as the type of this name typifies the genus and the species is also relatively close geographically. The material of *C. javanicum* (see Blume 1850) examined is insufficient to include a comparison of that species, however it is allied to *C. buchananii* and differs mainly in leaf morphology, *viz* the venation and size.

Table 1. Comparison of diagnostic characters for *Cryptolepis buchananii* Roemer & Schultes, *C. grayi* P. Forster, *C. nymanii* (Schumann) P. Forster and *C. papillata* P. Forster.

Character	*C. buchananii*	*C. grayi*	*C. nymanii*	*C. papillata*
lamina shape	elliptic-oblong	elliptic-oblong	elliptic- to ovate	lanceolate
number of secondary veins in lamina	20–25	13–15	11–13	27–30
leaves discolourous when dry, venation prominent below	yes	yes	yes	no
flower diameter (mm)	c. 10	c. 25	c. 12	c. 12
petal colour	yellow to greenish yellow	maroon	yellow golden brown or orange	orange-brown, dull orange
petal length	c. 6 × 1.5	c. 12 × 4	c. 10 × 2–2.5	c. 4–5 × 6
petals with papillae	absent	absent	absent	present
corolline corona around base of filaments	present	absent	absent	absent
rudimentary corona around base of filaments	absent	present	present	absent
raised papillate annulus extending to start of petals	absent	absent	absent	present
filament length, diameter (mm)	c. 0.25, 0.25	c. 3.5, 0.5	c. 0.25, 0.2	c. 1, 0.25
anther appendage length (mm)	c. 0.25	c. 1.00	c. 0.75	c. 0.25

Cryptolepis buchananii Roemer & Schultes, Syst. veg. 4: 409 (1819). **Type**: India orientali legit Franc. *Buchanan* (holo: BM, *n.v.*).
J.D. Hook., Fl. Brit. India 4: 5 (1885); Ali, Fl. Pakistan 150: 55 (1981).

Specimens examined. Nepal. Chitwan N.P., NE section of the park, south of Rapti River, 27°33′N, 84°29′E, May 1976, *Troth* 756 (CANB; US *n.v.*). **Burma.** Nyaungshwe, May 1958, *McKee* 6199 (CANB). **Sri Lanka.** CENTRAL PROVINCE: c. 10 miles [17 km] W of Mahiyangaru on the Kandy road, near mile marker 34/2, Nov 1974, *Davidse & Jayasuriya* 8427 (BRI); c. 4 miles [7 km] E of Pallegama, Oct 1974, *Davidse* 7387 (BRI).

Cryptolepis javanicum (Blume) Blume, Mus. bot. 2: 146 (1850); *Leposma javanicum* Blume, Bijdr. 1049 (1826–27); *Lepistoma javanicum* (Blume) Blume, Fl. Javae 7 (1828). **Type**: Kalkrotsen, Koeripan, *Blume* (holo: L(898166–349)).

Specimens examined. Java. Soerabaja, Dec 1924, *Dorgelo* 3167 (L); Res. Pekalongan, Soebah, Apr 1897, *Koorders* 27295 (L; BO *n.v.*); Apr 1935, *Coert* 1206 (L).

Transfers into *Cryptolepis* of a number of names for African taxa are made here, based on the original descriptions and accompanying illustrations.

Cryptolepis pendulina (Venter & D.V. Field) P. Forster **comb. nov.**

Stomatostemma pendulina Venter & D.V. Field, Bot. J. Linn. Soc. 99: 398 (1989). **Type**: Mozambique, Northern District, 17.6 km E of Namina, 24 August 1962, *Leach & Schelpe* 11441 (holo: K; iso: SRGH) (*fide* Venter & Field *loc. cit.*)

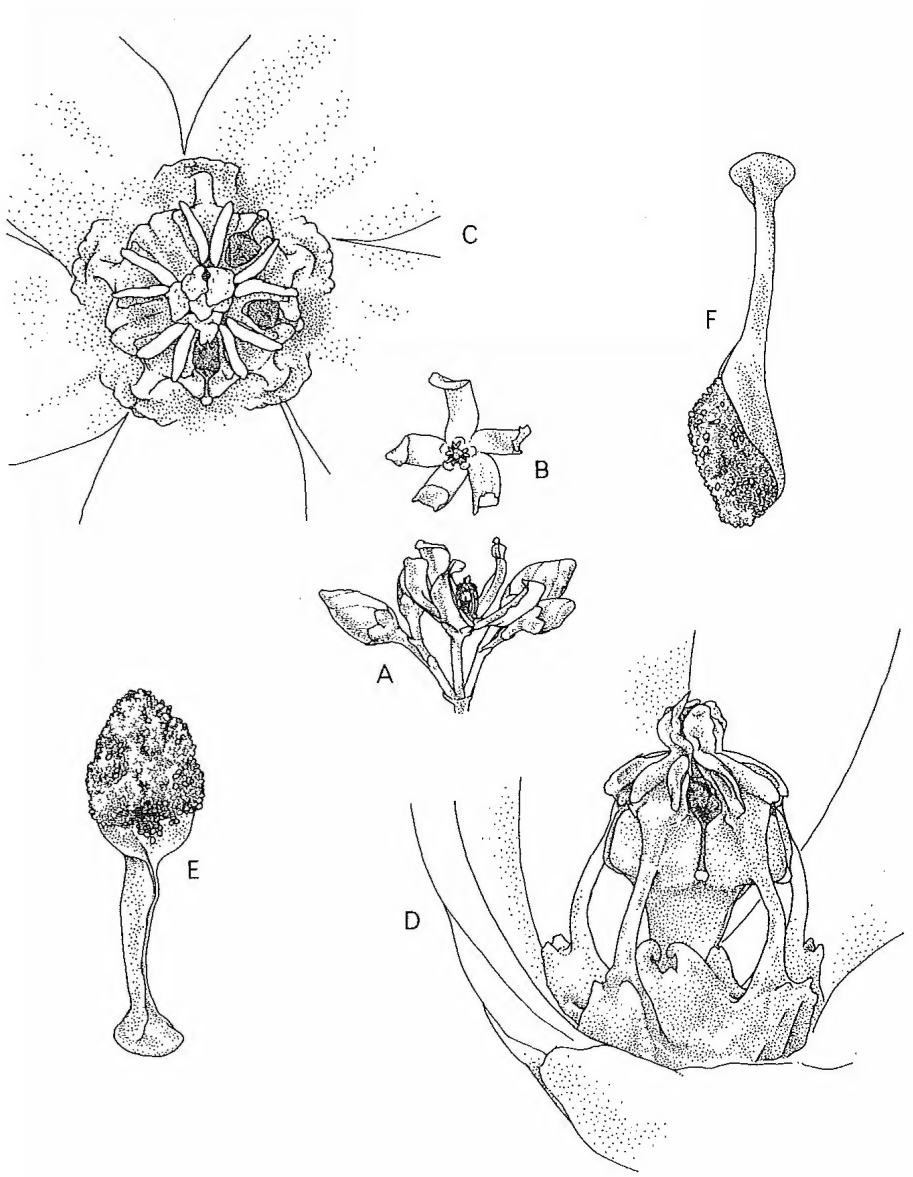

Fig. 3. *Cryptolepis grayi*: A. lateral view of single fascicle from cyme × 1. B. apical view of flower × 1. C. apical view of corona and stamens × 6. D. lateral view of corona, stamens and style × 6. E. front view of translator with granular pollen × 20. F. lateral view of translator with granular pollen × 20. All from spirit material of Gray 1561. Del. K. Harold.

Cryptolepis purpureus (N.E. Br.) P. Forster **comb. nov.**

Batesanthus purpureus N.E. Br. in J.D. Hook., Icon. pl. 25: t. 2500 (1896). **Type**: Efulen, Cameroons, *Bates* 383 (K, *fide* J.D Hook. *loc. cit.*).

Cryptolepis newii (Benth.) P. Forster **comb. nov.**

Gymnolaema newii Benth. in J.D. Hook., Icon. pl. 12: 74–75, t. 1186 (1876). **Type**: East tropical Africa, on Kilimanjaro mountain, *C. New* (K, *fide* Benth. *loc. cit.*).

2. *GUNNESSIA*

While resident at Weipa, Ann Gunness (née Morton) undertook intensive collecting of the local flora. This resulted in many new records from an area that had been botanically poorly known. Among these collections was material of an asclepiad that was not referable to any of the genera currently known to occur in Australia. Subsequently, further collections of this plant have been made on Cape York Peninsula, revealing that it is quite common in deciduous vine thickets. This material is not referable to any other genus of Asclepiadaceae and is described here as both a new genus and species belonging to the subfamily Asclepiadoideae.

Gunnessia pepo P. Forster **gen.** et **sp. nov.**

Liana lignea perennis latice albo. Caules cylindrici indumento denso in vittis longitudinalibus duobus restricto. Folia petiolata; lamina late lanceolati-ovata, base cordata usque rotundata, apice acuminata venis secundariis 5–6 infra laminae pallide cremeis et elevatis, nectariis extrafloralibus 6 basi praedita. Flores in nodis proxime apicem caulis portati. Cymae umbelliformes extra-axillares. Pedicelli indumento in vittis longitudinalibus duobus restricto. Flores globosi. Sepala triangularia, pilis uniseriatis parvis, glandibus in marginibus carentia. Corolla segmentis praeter apices connatis, tubo globoso depresso, extus papillato usque laevi, intus laevi, apicibus segmentorum acutis recurvatis extus intusque papillatis. Corona 2-seriata, serie exteriore ad basem columnae staminalis affixa, ex lobis exterioribus 5 incurvis spathulatis in annulum connatis constanti; serie interiore ex tubo parum carunculato interne, columnam staminalem cingenti, lobis 5 irregulatim denticulatis ab apice recurvatis et lobis 5 parvis cum corpusculi alternantibus circum medium tubi et ad angulum 90° cum eo constanti. Pollinia globosa, erecta usque horizontalia, sine margine ullo pellucido, aurea; corpusculum oblongum; caudiculae prope medium geniculatae ad basem corpusculum affixae. Folliculi binati, fusiformeovati. Semina ovata, comosa.
Typus: 1 km S of Cape York, 10°42′S, 142°32′E, 11 February 1986, *B. Gray* 4268 (holo: QRS*; iso: BRI*).

Woody perennial liane, with white latex. Stems cylindrical, to 6–7 m long and 6 mm diameter, grey-green ageing grey; with dense indumentum restricted to two longitudinal bands; internode length variable to 10 cm. Leaves petiolate; lamina broadly lanceolate-ovate, up to 15 cm long and 10 cm wide, base cordate to rounded, tip acuminate, upper surface grey-green, pale bluish grey abaxially; secondary veins 5 or 6, pale cream and raised abaxially; petiole up to 35 mm long and c. 2 mm diameter; extrafloral nectaries 6 at base of lamina. Cymes borne on nodes directly below stem apex, extra-axillary, umbelliform, 1–8-flowered; bracts triangular, c. 1 mm long and 0.25 mm wide, with sparse to dense indumentum; peduncle to 3.5 mm long, c. 1.5 mm diameter, grey-green, with short, sparse indumentum. Flowers globose, 3–4 mm long, 15–16 mm diameter; pedicels c. 6 mm long and 1 mm diameter, grey-green, with short sparse to dense indumentum restricted to two longitudinal bands. Sepals triangular, c. 2.5 mm long and 2 mm wide, ciliate, calycine glands absent. Corolla pale yellow to cream, segments fused apart from tips, tube depressed globose, papillate to smooth externally, smooth internally, 3–4 mm long and 15–16 mm diameter; tips acute, recurved, c. 1 mm long and 1 mm wide, papillate internally and externally. Corona pale yellow to cream, in 2 series. Outer coronal series attached to base of staminal column, comprising 5 lobes fused into an annulus c. 2 mm high and 3 mm diameter; each lobe incurved, spathulate, c. 1 mm long and 1 mm wide. Inner coronal series comprising a tube surrounding the staminal column, slightly carunculate internally, c. 2 mm long and 3 mm diameter, with 5 irregularly toothed lobes recurving back from the top of the tube; each lobe c. 0.5 mm long and 0.5 mm wide; halfway down the tube are 5 smaller lobes alternate with the corpuscles, that are at 90° to the tube wall. Staminal column c. 1.5 mm long and 1.5 mm diameter. Anther appendages acute, c. 0.5 mm long and 0.5 mm wide. Slit between anther wings c. 0.5 mm long. Style-head depressed globose, not exceeding anthers, c. 1 mm diameter. Pollinaria c. 0.2 mm long and 0.6 mm wide; pollinia globose, held erect to horizontal, lacking any pellucid margin, c. 0.2 mm long and 0.15 mm wide, golden; corpusculum oblong, 0.1–0.11 mm long, c. 0.05 mm wide, tan; caudicles geniculate near middle, attached to bottom of corpusculum, c. 0.1 mm long and 0.03 mm wide. Follicles paired, fusiform-ovoid, ribbed along suture, to 8 cm long and 2.5–3 cm wide. Seeds ovate, 8–9 mm long, 4–6 mm wide, tan; coma 20–25 mm long, white. **Figs 4 & 5.**

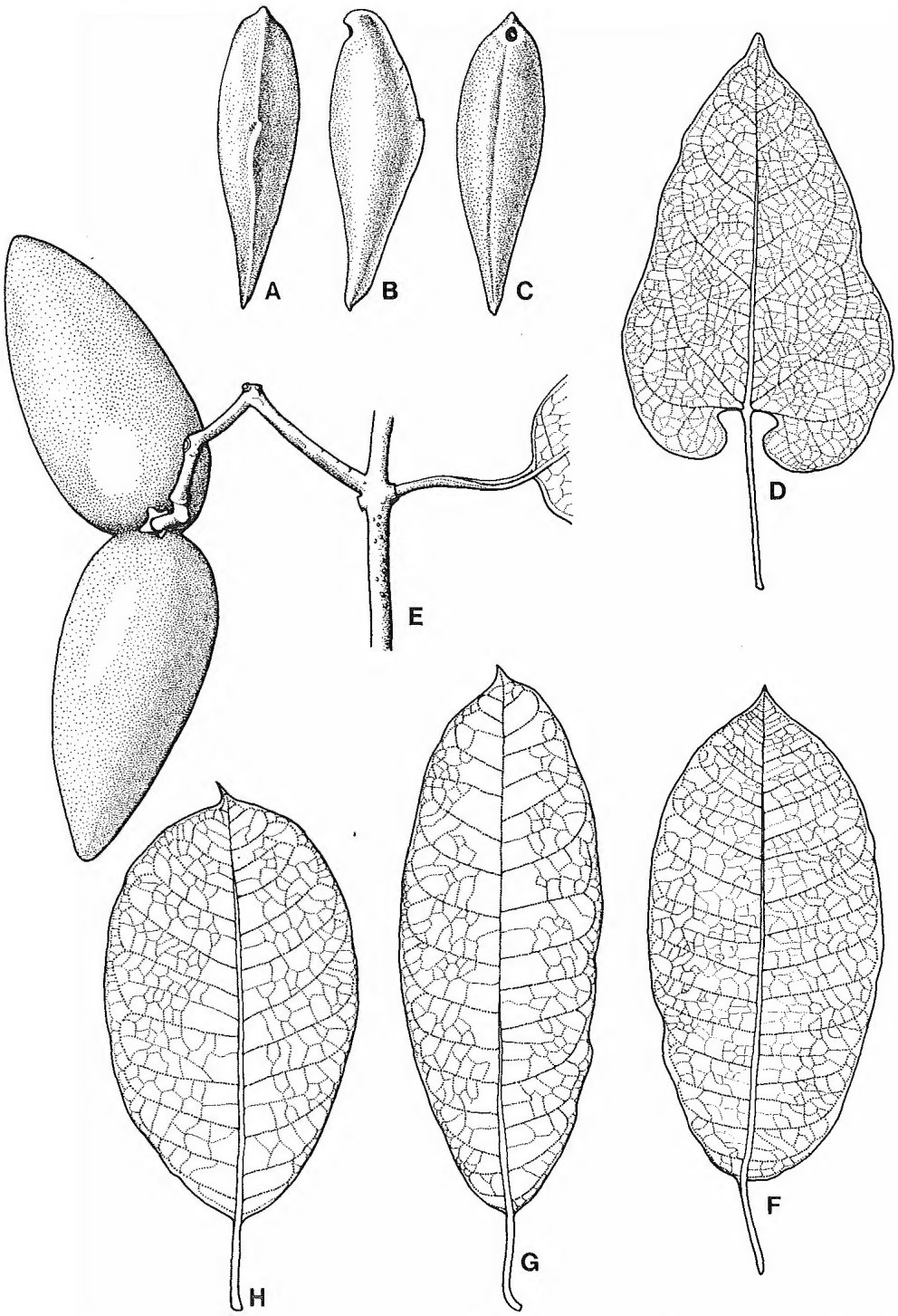

Fig. 4. A–D. *Gunnessia pepo*: A. apical view of fruit showing region of suture × 0.55. B. lateral view of fruit showing keeled area of suture × 0.55. C. ventral view of fruit × 0.55. D. abaxial leaf surface showing detail of venation × 0.55. E–F. *Cryptolepis grayi*: F. ventral view of twin-follicle × 0.55. E. abaxial leaf surface showing detail of venation × 0.55. G–H. *Cryptolepis nymanii*: G. abaxial leaf surface showing detail of venation × 0.55. H. abaxial leaf surface showing detail of venation × 0.55. A–C, O'Reilly [AQ456952] D, Forster 4416 & Liddle; E,F, Forster 3849; G, Womersley NGF19427; H, Streimann & Kairo NGF21183. Del. L.G. Jessup.

Specimens examined. Queensland. COOK DISTRICT: c. 6 km S of Cape York, 10°42′S, 142°32′E, Feb 1986, *Jones* 2311 (BRI); 2.7 km past Lockerbie HS site on road to Cape York, 10°47′S, 142°29′E, Jun 1988, *Forster* 4416 & *Liddle* (BRI); Myerfield road from Weipa to Stone Crossing, Wenlock River, 12°26′S, 142°05′E, Nov 1986, *Jessup* 812 (BRI); Kennedy Hill Gorge, 12°28′S, 143°16′E, Jun 1989, *Forster* 5393 (BRI); 62.2 km past Moreton Telegraph Station on Carron Valley road, 12°30′S, 143°06′E, Jun 1988, *Forster* 4577 (BRI); 44.4 km east by road of Maloney's Springs, 12°30′S, 143°15′E, Jun 1989, *Forster* 5432 (BRI); Unigan Reserve, Weipa, 12°36′S, 141°55′E, Jan 1989, *O'Reilly* [AQ456946] (BRI*); Beach Flats area, Rocky Point, Weipa, 12°36′S, 141°51′E, Feb 1989, *O'Reilly* [AQ456953] (BRI*); Rocky Point, Weipa, 12°37′S, 141°52′E, Dec 1988, *O'Reilly* [AQ456948] (BRI*), ditto, Jan 1989, *O'Reilly* [AQ456949] (BRI*); Lake McLeod, Weipa, Feb 1989, *O'Reilly* [AQ456944] (BRI*); Lake Patricia, Weipa, 12°39′S, 141°50′E, Apr 1988, *Forster* 4076 & *Liddle* (BRI,K); Meeka Scrub near Andoom, 12 NNW of Lorim Pt, 12°34′S, 141°49′E, Apr 1988, *Forster* 4080 & *Liddle* (BRI*); ditto, Dec 1980, *Morton* 938 *et al.* (BRI,QRS); Mt White, Coen, 13°56′S, 143°11′E, Jun 1989, *Forster* 5526 (BRI,DNA).

Distribution and habitat: Presently known only from far north Queensland, in the vicinity of Weipa, Bamaga (Lockerbie Scrub), east of Moreton Telegraph Station and from Mt White at Coen (**Map 1**). Plants are present as canopy lianes and occur in association with other asclepiadaceous vines such as *Marsdenia velutina* R. Br. (which is superficially similar in appearance), *Cynanchum leptolepis* Benth., *Ceropegia cumingiana* Decne., *Tylophora benthamii* Tsiang, *Secamone elliptica* R. Br., *Gymnema geminatum* R. Br., *Toxocarpus* sp. and *Marsdenia cymulosa* Benth. The community type is deciduous vine thicket. At Lake Patricia, the soil is a deep sand with organic matter, whereas at the Meeka Scrub, it is a red laterite and at Lockerbie a red soil similar in texture to krasnozems.

Phenology: Flowering from December to March, fruiting 2–3 months later.

Notes: This species represents a remarkable new genus of asclepiad. It does not appear to be closely allied to any of the other genera that occur in Australia, New Guinea or Asia with the most distinctive features being the globose corolla, and the double corona with the inner corona forming a tube around the staminal column and possessing small lobes halfway down. The flowers, with respect to the corolla and staminal corona, are superficially similar to those of *Stapeliopsis neronis* Pillans (Bruyns 1981), *Echidnopsis malum* (Lavranos) Bruyns (Bruyns 1988) and the recently described *Heterostemma vasudevani* Swarupanandan & Mangaly (Swarupanandan *et al.* 1989) of the Stapelieae. However, *G. pepo* is not closely related to the Stapelieae due to the pollinia lacking a pellucid margin, anthers with appendages and the presence of white latex. *G. pepo* is at first appearances very similar to *H. vasudevani* (which is probably a redescription of *Oianthus beddomei* J.D. Hook.), but the pollinaria of *H. vasudevani* have erect, ellipsoid pollinia with pellucid margins and short non-geniculate caudicles. There are also differences in the staminal corona tube, with that of *H. vasudevani* obviously resulting from five lobes being fused together, whereas in *G. pepo*, the degree of fusion is sufficiently advanced that the original five lobes comprising the tube are no longer discernable. Presumably the morphologically similar flowers of all four of these taxa mentioned here are a result of selection for similar pollination syndromes.

Geniculate caudicles are uncommon in Asclepiadaceae native to the Australian-Malesian region. They are present in *Sarcolobus* R. Br. (Rintz 1980a) but the caudicles in species of that genus are much longer than those of *Gunnessia*. In species of *Sarcolobus* the corolla is rotate and the tubular staminal corona is absent. The pollinaria of *Gunnessia* are similar to those of many species of *Tylophora* R. Br. particularly with respect to the globose pollinia, but in most other characters the flowers of these genera are quite dissimilar.

Etymology: The genus is named for Mrs Ann Gunness who first collected material of this plant and made valuable collections of plants in the Weipa area. The specific epithet alludes to the resemblance of the flower to the fruit of certain vegetable squashes in the family Cucurbitaceae.

Conservation status: Plants are common in the deciduous vine thickets at Weipa and at the Lockerbie Scrub. It is probably not endangered at present.

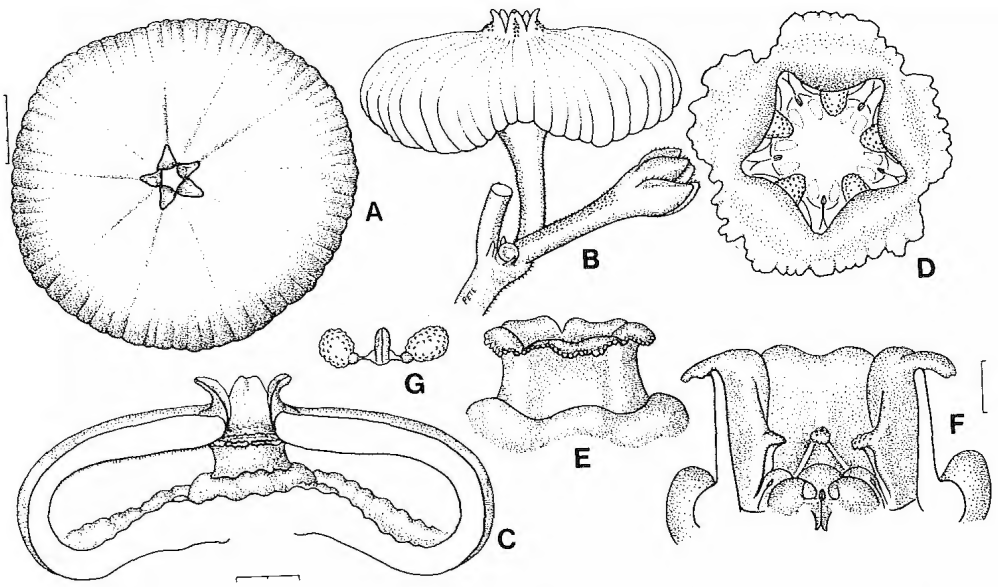

Fig. 5. *Gunnessia pepo*: A. apical view of corolla (scale 3 mm). B. lateral view of corolla (scale 3 mm). C. lateral view of dissected corolla showing staminal corona (scale 2 mm). D. apical view of staminal corona (scale 0.5 mm). E. lateral view of staminal corona (scale of A = 1 mm). F. lateral view of dissected staminal corona (scale 0.5 mm). G. pollinarium (scale of A = 0.25 mm). All from Gray 4268. Del. P. V. Bruyns.

3. *MARSDENIA*

Marsdenia velutina was described by Robert Brown from material he collected in 1803 in northern Australia and has been considered as endemic in Australia. When Schlechter (1914) renamed Warburg's *M. verrucosa* as *M. papuana* he commented that this species was very similar to *M. velutina* from northern Australia. A number of collections from New Guinea and the Solomon Islands are of *M. velutina* and show no differences from Australian material of it. From the description published by Warburg it is evident that *M. papuana* is conspecific with *M. velutina.*

Marsdenia velutina R. Br., Prodr. 461 (1810); *Pergularia velutina* (R. Br.) Sprengel, Syst. veg. 1: 844 (1820); *Tylophora velutina* (R. Br.) G. Don., Gen. hist. 4: 128 (1838). **Type**: Northern Territory, mainland opposite Groote Eylandt, 4 January 1803, *R. Brown* (lecto (here designated): BM, 2 sheets (photo BRI!)).
Decne. in DC., Prodr. 8: 614 (1844); Benth., Fl. austral. 4: 338 (1869); Bailey, Queensl. fl. 3: 1008–1009 (1900); Funke, Ann. Jard. Bot. Buitenzorg 41: t. 18, fig. 24 (1930).

Marsdenia papuana Schltr., Bot. Jahrb. Syst. 50: 144 (1914) **synon. nov.**; *Marsdenia verrucosa* Warb., Bot. Jahrb. Syst. 13: 410 (1891) non *M. verrucosa* Decne. **Type**: not designated.
K. Schum., Fl. Kais.-Wilh. Land 141 (1889); K. Schum. & Lauterb., Fl. Schutzgeb. Südsee 514 (1905).

Marsdenia klossii S. Moore, Trans. Linn. Soc. London, Bot. 9: 112 (1916). **synon. nov. Type**: Canoe Camp, Utakwa River to Mt Carstensz, Dutch New Guinea, 1912–13, *C.B. Kloss* (holo: BM!).

A full description and citation of Australian collections will be given in my forthcoming revision of *Marsdenia* in Australia. The following material from New Guinea and the Solomon Islands belongs here.

Selected specimens. Irian Jaya. Rouffaer River, Aug 1926, *Docters van Leeuwen* 10083 (L; BO *n.v.*); Hollandia, Dec 1954, *McKee* 1793 (L). **Papua New Guinea.** BOUGAINVILLE: Siwai, Jul 1930, *Waterhouse* 160–B (A,L; K *n.v.*). EAST SEPIK DISTRICT: Augusta River, Oct 1910, *Gjellerup* 360 (A; BO *n.v.*). MADANG DISTRICT: Gogol Valley, 5°13′S, 145°35′E, Jan 1977, *Wiakabu et al.* LAE60369 (A; LAE *n.v.*). MOROBE DISTRICT: Umi River, 6°15′S,

146°15′E, Jan 1963, *Millar & van Royen* NGF15641 (BRI,CANB; LAE *n.v.*); Vicinity of Kajabit Mission, Aug–Dec 1939, *Clemens* 40845 (A,BRI); Boana, May–Nov 1940, *Clemens* 41626 (A), 41373 (A); Near Picra, c. 10 miles [16 km] SE of Garaina, Jan 1964, *Hartley* 12624 (A,BRI,CANB,L); Near Village of Yalu, c. 12 miles [20 km] NW of Lae, May 1963, *Hartley* 11875 (A,BRI,CANB,L); c. 2.5 miles [4 km] N of Gurukor, 6°50′S, 146°38′E, Feb 1962, *Hartley* 9912 (BRI,CANB); Near the Butibum River, c. 7 miles [12 km] N of Lae, May 1962, *Hartley* 10283 (A,BRI,CANB,L); near Markham River bridge, W of Lae, May 1960, *Thorne & Henty* 27540 (BRI,L). CENTRAL DISTRICT: Nebiri Quarry, Apr 1970, *Gebo* UPNG375 (BRI); Kokoda, Apr 1936, *Carr* 16362 (CANB); near Kokoda, Sept 1954, *Hoogland* 3907 (L). MILNE BAY DISTRICT: Rigo district, *Turner* [AQ217168] (BRI). PAPUAN ISLANDS: Dixons Bay, Bessels Is, Louisiade Group, Jan 1885, *Chalmers & Bridge* [AQ361109] (BRI). **Solomon Islands.** Waimamura, San Cristobel, Sep 1932, *Brass* 2832 (BRI; A *n.v.*); N of Palasu'u School, Small Malaita, Sep 1969, *Gafui* BSIP17307 (L); Matanikolo River, NW Guadalcanal, Nov 1967, *Nakisi, Ben & Mauriasi* BSIP8247 (L).

4. *TYLOPHORA*

As a precursor to publication of revisions of *Tylophora* R. Br. in Australia and New Guinea, it is useful to recognise the occurrence of *T. flexuosa* R. Br. in New Guinea. While it has not been possible to locate any type material of *T. perlaxa* Schltr., Schlechter's description correlates well with *T. flexuosa* and specimens collected by Brass from the Fly River belong to this latter species. Citation of Australian material and a description will be published in my forthcoming revision of the genus in Australia.

Tylophora flexuosa R. Br., Prodr. 460 (1810); *Hoya flexuosa* (R. Br.) Sprengel, Syst. veg. 1: 843 (1820); *Vincetoxicum flexuosum* (R. Br.) O. Kuntze, Revis. gen. pl. 2: 424 (1891). **Type**: Groote Eylandt, Northern Territory, January 1803, *R. Brown* (lecto (here designated): BM (photo BRI!); isolecto: CANB(CANB278897)).

Tylophora perlaxa Schltr., Bot. Jahrb. Syst. 40, Beibl. 92: 3 (1908), **synon. nov. Type**: British New Guinea, Fly River, November 1885, *W. Bauerlen* (holo: B†).

Specimens examined. Indonesia. Irian Jaya. Road from Mopa Airstrip to Manggatrikke, Merauke district, Aug 1954, *van Royen* 4560 (CANB; L *n.v.*); Bernhard Camp, Idenburg River, Apr 1939, *Brass* 13939 (A,BRI; CANB *n.v.*); Hamadi, Hollandia, Nov 1956, *v.d. Sijde* BW4116 (L; BO *n.v.*); Warmare Valley, c. 20 km SW of Manokwari, Jun 1962, *Koster* BW13985 (L). **Papua New Guinea.** MANUS DISTRICT: Near Pelikawa, 2°10′S, 149°50′E, Oct 1974, *Foreman & Katik* LAE59120 (BRI; A,CANB,K,L,LAE *n.v.*). WESTERN DISTRICT: Morehead River, 8°44′S, 141°38′E, Nov 1972, *Henty & Foreman* NGF49332 (BRI; A,BISH,BO,CANB,K,L,LAE,NSW,PNH, SING,US *n.v.*); Upper Wassi Kussa River (left branch), Jan 1937, *Brass* 8622 (BRI; A *n.v.*); Oroville Camp, Fly River (30 miles [50 km] above D'Albertis Junction), 1936, *Brass* 7440 (BRI; A *n.v.*). MOROBE DISTRICT: Mouth of Markham River, inlet of Lae Harbour, Markham Beach, Feb 1976, *Larivita & Henty* LAE70539 (BRI; L *n.v.*); Waigani swamp, Jan 1981, *Leach* UPNG3789 (A; BISH,G,L,LAE,M,MEL,NY *n.v.*). NORTHERN DISTRICT: 5 km E of Popondetta airport, near Sambogo River, 8°46′S, 148°22′E, Oct 1975, *Wiakabu & Kairo* LAE70293 (BRI; LAE *n.v.*). MILNE BAY DISTRICT: Bolo Bolu, Goodenough Is, Sep 1953, *Brass* 24367, 24448 (A). UNPLACED TO DISTRICT: Ira Tailala River, Mar 1926, *Brass* 1166 (A). Woodlark Is, Unkinbod Bay, Nov 1956, *Brass* 28760 (A; L *n.v.*).

5. *DISCHIDIA*

Schlechter in his studies of Malesian Asclepiadaceae, recognised four segregate genera in addition to *Dischidia* R. Br., namely *Conchophyllum* Blume, *Dischidiopsis* Schltr. (Schlechter & Warburg 1904), *Spathidolepis* Schltr. (Schlechter 1905) and *Oistonema* Schltr. (Schlechter 1908). None of these can be maintained when the modern concept of *Dischidia* proposed by Rintz (1980b) is followed. The types of *Dischidiopsis* (*D. philippinensis* Schltr.) and of *Oistonema* (*O. dischidioides* Schltr.) are based on material from the Philippines and Borneo respectively, whereas no type was designated for *Conchophyllum*. *Dischidiopsis*, *Oistonema* and *Conchophyllum* are not considered further here as *Dischidia* is in need of revision in Malesia and names may already be available in *Dischidia* for those particular species.

As part of my studies on the Asclepiadaceae of Papuasia, however, I have had to critically examine the status of *Spathidolepis*. In describing *Spathidolepis*, Schlechter (1908) considered the single species, *S. torricellensis* Schltr. close to *Dischidia* but differing from it in the small coronal lobes and the thin leathery leaves. Neither of these characters is a valid distinguishing feature. Species such as *D. superba* Rintz have similar small coronal lobes (Rintz 1979) and while many *Dischidia* species have fleshy leaves, there is a complete gradation from species with fleshy ones to others with membranous ones. An isotype of *S. torricellensis* at K lacks flowers; however its foliage can be matched with that of several fertile specimens from New Guinea. These collections match the floral description given by Schlechter for *S. torricellensis* and are also recorded as collected from a habitat type similar to that recorded for *S. torricellensis*. Hence they are considered as conspecific with the type collection.

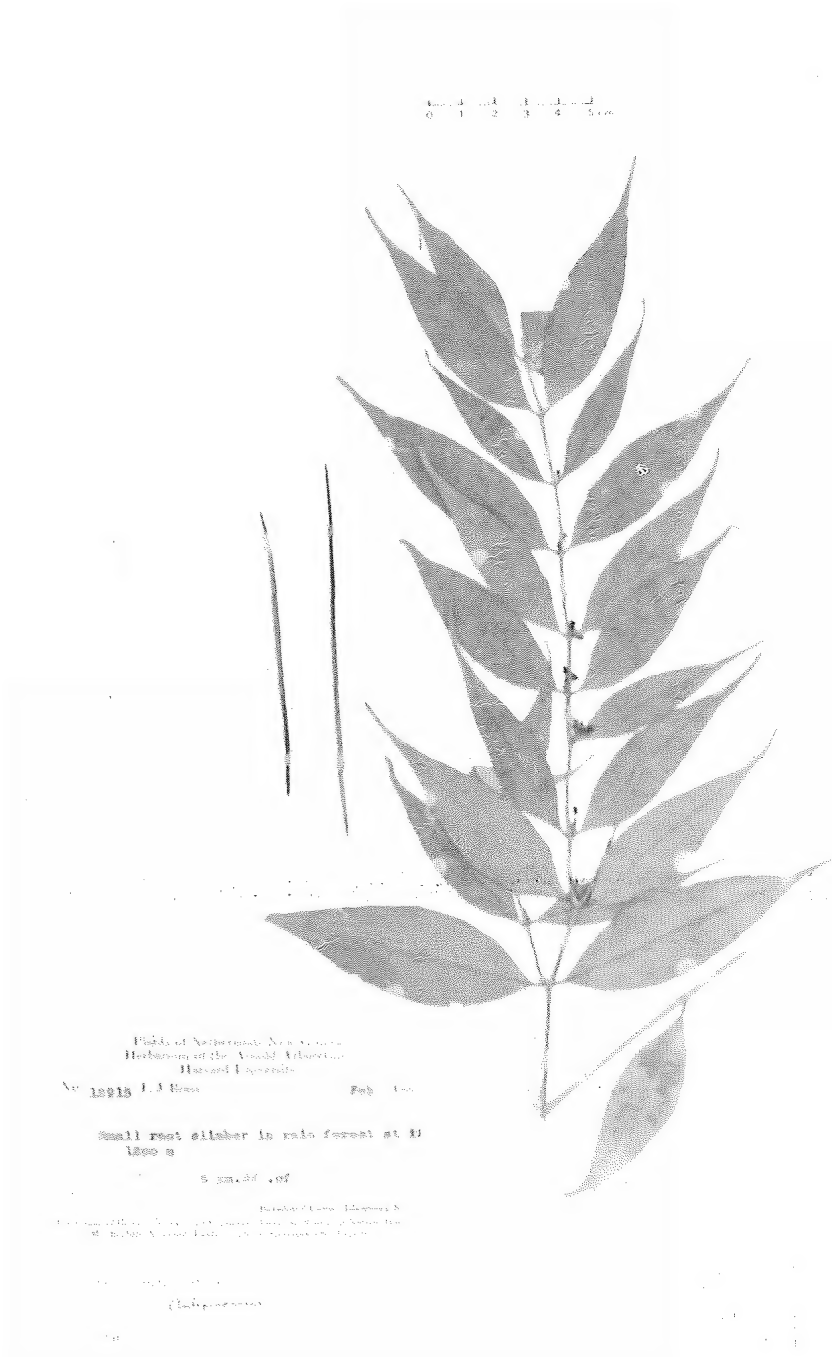

Fig. 6. Specimen of *Dischidia torricellensis* (Schltr.) P. Forster (Brass 12915) at BRI.

Dischidia torricellensis (Schltr.) P. Forster **comb. nov.**

Spathidolepis torricellensis Schltr. in Schumann & Lauterb., Nachträge Fl. Schutzgeb. Südsee 356 (1905). **Type**: Nordöstl. New-Guinea: auf Bäumen in den Wäldern des Torricelli-Gebirges, April 1902, *R. Schlechter* 14445 (holo: B†; iso: K (photo BRI!)).
Schltr., Bot. Jahrb. Syst. 50: 95 (1914).

Epiphytic perennial liane. Stems cylindrical, to 2 mm diameter, with sparse short indumentum of uniseriate hairs; internodes to 9 cm long. Leaves petiolate; lamina coriaceous, glabrous, lanceolate-elliptic, 5–9 cm long, 1–3 cm wide, with obvious reticulate venation, mid-rib raised abaxially, sunken adaxially; apex caudate to cuspidate, obtuse at tip; base cuneate; secondary veins 16–17; petiole grooved adaxially, 2–3 mm long, c. 1 mm diameter; extrafloral nectaries 2 at base of lamina. Inflorescence an umbelliform raceme-like cyme to 5 mm long; bracts triangular, c. 1 mm long and 1 mm wide, with sparse indumentum; peduncle to 1 cm long and c. 2 mm diameter. Flowers urceolate, 3–4 mm long and 2–4 mm diameter; pedicels 2–4 mm long, c. 0.5 mm diameter, with dense indumentum. Sepals oblong, c. 2 mm long and 1 mm wide, ciliate, with 1 or 2 glands at base of each sinus. Corolla white; tube 2–3 mm long, 2–3 mm diameter, glabrous externally and internally; petals erect, ovate, fused for two-thirds of length, each strongly jointed in middle and with tips reflexed, c. 2 mm long and 2.5 mm wide; externally glabrous, internally with region of dense antrorse hairs to c. 1 mm long in centre of petal, blocking entrance to tube. Staminal corona c. 1 mm long and 2 mm diameter, attached to bottom of staminal column and consisting of 5 separate lobes; each lobe spathulate-obovate and recurved-winged at base on either side, entire lobe c. 0.75 mm long and 0.75 mm wide, wings 0.3–0.4 mm wide. Staminal column c. 1.5 mm long and 1 mm diameter. Anther appendages oblong-obtuse, incurved over style-head, 0.5–0.75 mm long, c. 0.25 mm wide. Slit between anther wings c. 0.75 mm long. Style-head elongate-conical, c. 0.75 mm long, 0.25 diameter at tip and 0.75 mm diameter at base. Ovaries c. 1 mm long, glabrous. Pollinaria c. 0.4 mm long and 0.26 mm wide; pollinia held erect, oblong, 0.35–0.37 mm long, c. 0.1 mm wide; corpusculum oblong, 0.2–0.25 mm long, c. 0.08 mm wide; caudicles winged, c. 0.15 mm long and 0.1 mm wide. Follicles fusiform (immature), glabrous, 11–12 cm long, c. 2 mm diameter. Seed not seen. **Fig. 6.**

Specimens examined. Irian Jaya. Jayapura: 6 km SW of Bernhard Camp, Idenburg River, Feb 1939, *Brass* 12915 (BRI; A *n.v.*); Rouffaer River, Sep 1926, *Docters van Leeuwen* 10275 (L; BO *n.v.*).

Distribution and habitat: Known only from the Torricelli Mountains, Idenburg River and Rouffaer River areas (**Map 1**) where it grows as an epiphyte in rainforests over 1000 m alt.

Acknowledgements

P.V. Bruyns (BOL), K. Harold and L.G. Jessup provided the illustrations. L. Pedley provided the latin diagnoses. B. Gray (QRS) initially brought the material of *C. grayi* to my attention. B. Leuenberger (B) provided a list of Schlechter types held at B. K.L. Wilson (NSW) and G.P. Guymer (BRI) while Australian Botanical Liasion Officers at Kew, located and photographed various types. P.R. Sharpe provided translations of various German language publications. Collections were made by M. O'Reilly or on trips with P.D. Bostock, G. Kenning, D.J. Liddle and M.C. Tucker. K. Harold and E.M. Ross (BRI) commented on the manuscript. The Queensland Herbarium provided working space and processed loan material. The Directors and Curators of A, BRI, CANB, L, QRS and UPS allowed access to collections either at their institutions or on loan. The Australian Biological Resources Study provided funds in 1988 and 1989. All are gratefully thanked for their assistance.

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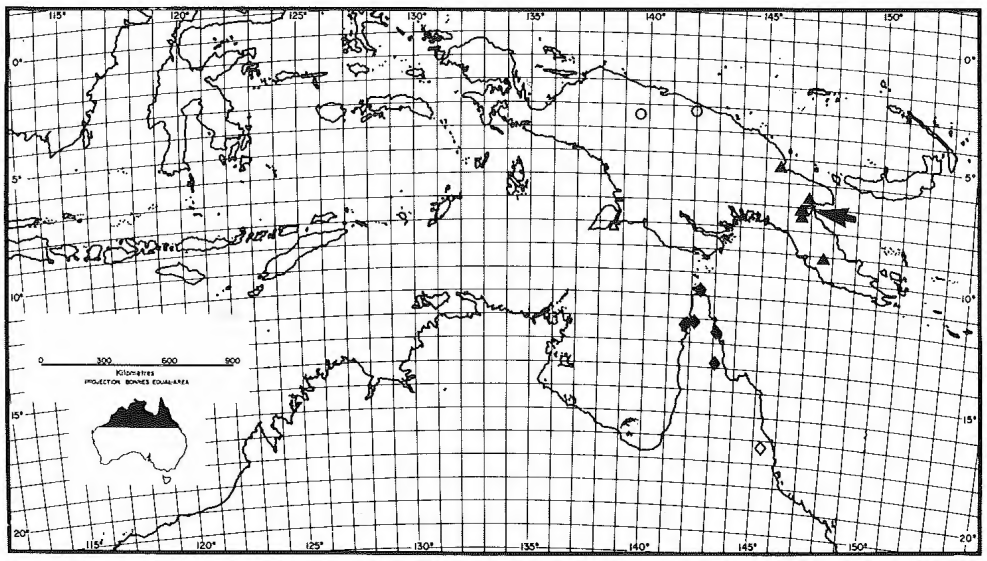

Map 1. Distribution of *Cryptolepis nymanii* (▲), *C. papillata* (▽, arrowed), *C. grayii* (◇), *Gunnessia pepo* (◆) and *Dischidia torricellensis* (○).

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Accepted for publication 6 February 1990

Austrobaileya 3(2): 291–295 (1990)

A NEW SPECIES OF *EUCALYPTUS* L'HERIT. (MYRTACEAE) FROM SOUTHERN QUEENSLAND

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Summary

***Eucalyptus infera*, a new species of *Eucalyptus* (*E.* Subgenus *Symphyomyrtus* Pryor and Johnson nom. inval.) is described, and notes on its taxonomic affinities, habitat, distribution and conservation status are given.**

Eucalyptus infera A. Bean **sp. nov.** affinis *E. camphorae* R. Baker sed differt habitu constanter "mallee", cortice e summo humo laevi, foliis vivide viridibus, alabastris cornuatibus, fructibus valvis valde exsertis praeditis. **Typus**: Queensland. DARLING DOWNS DISTRICT: southern end of S.F. 444, south-west of Warwick, 28°24′S, 151°42′E, 4 October 1988, *A.R. Bean* 936 (holo: BRI; iso: CANB,MEL,NSW).

Eucalyptus dealbata var. *populnea* Blakely; Key to the Eucalypts (1934). **Type**: Queensland, Darling Downs District, Inglewood, October 1922, *C.J. Smith* (holo: NSW *n.v.* iso: BRI!).

A mallee to 8 m high, stems up to 150 mm diameter. Bark smooth throughout, shiny, coppery to olive-green in colour, shedding in narrow ribbons, and lacking oil glands. Lignotuber present. Cotyledons bilobed, c. 2 × 3 mm. Seedling leaves petiolate, opposite for about five pairs, elliptical, to 30 × 15 mm, dull green above, paler and often purplish below. Seedling stems glandular, verrucose. Juvenile leaves (after about Node 12) alternating, petiolate; petioles up to 21 mm long; laminae glossy green, discolourous, crenulate, ovate to orbicular, to 70 × 70 mm, mucronate or emarginate. Stems angular. Adult leaves alternating, petiolate; petioles up to 25 mm long; laminae glossy green, concolourous, broadly lanceolate to elliptical, 60–79 × 27–38 mm, margins slightly crenulate. Intramarginal vein remote (2–3 mm) from the margin. Oil dots abundant, several per areole. Inflorescences axillary, 9–18-flowered. Peduncles terete or slightly angular, 10–14 mm long. Pedicels 2–5 mm long. Buds to 15 × 5 mm, hypanthium hemispherical, operculum elongated, horn-shaped, 2.5–3 times longer than broad. Stamens white, all erect in bud, all fertile. Anthers versatile, dorsifixed. Stigma blunt. Fruit pedicellate, truncate-globular, 5–6 × 5–6 mm; disc broad, convex; valves (3)4, strongly exserted. Seeds black or brown, wedge-shaped, angular, reticulate, not lacunose, hilum terminal. Ovules in 6 rows on placenta. **Figs 1 & 2.**

Specimens examined: Queensland. DARLING DOWNS DISTRICT: Herries Range, Inglewood, Oct 1922, *Smith* (BRI,NSW); Herries Range, near Warwick–Pikedale road, Dec 1987, *Bean* 715, 716, 717 (BRI,NSW); southern end of S.F. 444, south-west of Warwick, Oct 1988, *Bean* 934, 936 (BRI,CANB,MEL,NSW); ditto, Jan 1989, *Bean* 984 (BRI,MEL,NSW).

Distribution and habitat: *Eucalyptus infera* is currently known from just one locality near the Herries Range south-west of Warwick where it covers an area of 40–50 hectares. Most commonly it grows in or next to often-dry watercourses, but it also extends onto adjacent low rises. Its altitudinal range is 725–750 metres. The soil type in areas where *E. infera* occurs is a grey sandy-clay, sometimes with a gravelly surface layer.

E. infera occurs as a component of an open forest community, growing as an understorey to other *Eucalyptus* species, such as *E. maculata* Hook., *E. fibrosa* F. Muell. subsp. *fibrosa*, *E. melliodora* Cunn. ex Schauer, *E. crebra* F. Muell., *E. tereticornis* Smith, and *E. moluccana* Roxb. Other associated plants include *Melaleuca decora* (Salisb.) J. Britten, *Racosperma lineatum* (Cunn. ex G. Don) Pedley, *Racosperma fimbriatum* (Cunn. ex G. Don) Pedley, *Jacksonia scoparia* R. Br. and *Melichrus urceolatus* R. Br.

Flowering period: September–November.

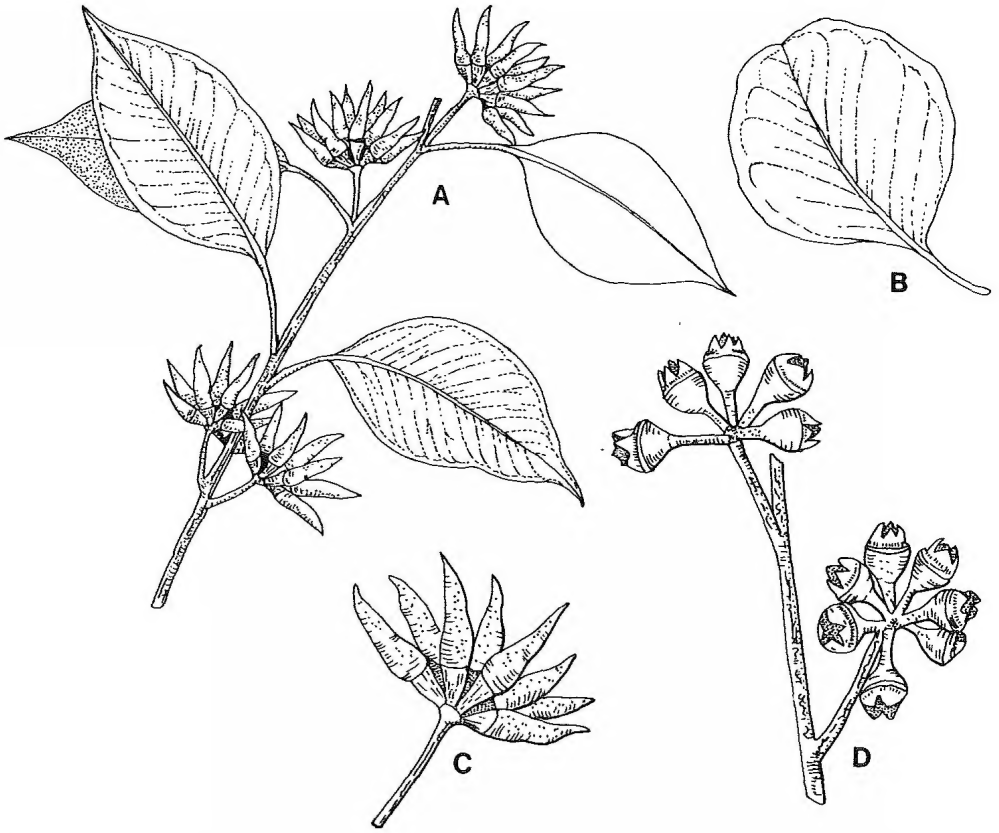

Fig. 1. *Eucalyptus infera*: A. twig with mature buds and leaves × 0.5. B. juvenile leaf × 0.5. C. mature buds × 1. D. fruits × 1.

Affinities: *Eucalyptus infera* is a distinctive species which can be readily distinguished from all other eucalypts. However, its affinities are not immediately obvious.

Its buds, fruits and seeds show a strong affinity with those of species of Series *Exsertae* Blakely (Chippendale 1988), the Red Gums. The buds are horn-shaped, with stamens all erect in bud. The fruits have a convex disc and strongly exserted valves. The seeds are dark and angular, not lacunose, with a terminal hilum. These are all characteristics of Series *Exsertae*. Also, the ovules are in six longitudinal rows, in common with members of the Red Gum group (Brooker 1979). Of the species in this group, *E. amplifolia* Naudin most resembles *E. infera*, because of the broad juvenile leaves, large number of buds per inflorescence and the habitat it occupies. *E. amplifolia* reaches its northern limit near the Queensland/New South Wales border at around 900 m altitude.

The seedling, juvenile and adult leaves, seedling stems, bark characters and habitat show a strong affinity with the Series *Foveolatae* Maiden (Chippendale 1988), the Swamp Gums. The seedling and juvenile leaves of *E. infera* are broad, distinctly crenulate and emarginate, and its seedling stems are verrucose. Its bark is uniform in colour and sheds in narrow ribbons. It grows on poorly drained sites. These are all characteristics of Series *Foveolatae*. Of the species in this group, *E. camphora* R. Baker most resembles *E. infera* because of its broad adult leaves and fruits with exserted valves. Also, it differs from *E. infera* in only one of the thirteen seedling characters used by Ladiges *et al.* (1984) to elucidate relationships within Series *Foveolatae* and some related species. *E. camphora* reaches its northern limit on the Queensland/New South Wales border, at about 1100 m altitude.

Oil glands in the bark have been found to be useful in taxonomic studies in *Eucalyptus* (Chattaway 1955). These glands are absent in Series *Exsertae*, but present in Series *Foveolatae* and other related series. Bark oil glands are absent in *E. infera*. While they are present in *E. camphora*, they occur very sporadically compared to some other species e.g. *E. viminalis* Labill.

E. infera clearly differs from both Red Gums and Swamp Gums, and would perhaps best be placed in a separate series between Series *Exsertae* and *Foveolatae*. **Table 1** shows how *E. infera* differs from both *E. camphora* and *E. amplifolia*.

Notes: Blakely named this taxon at varietal rank. It is however worthy of species rank by virtue of its distinctiveness as outlined in the above table. Since the epithet *populnea* is already occupied at species rank for an unrelated taxon, this taxon is described under a new name.

Table1. Comparison of *E. infera*, *E. camphora* and *E. amplifolia*

Character	*E. infera*	*E. camphora*	*E. amplifolia*
Habit	always a mallee	mallee or tree	always a tree
Height	5–8 m	10–21 m	to 30 m
Bark	coppery to olive-green, uniform no stocking of rough bark	grey to brownish-grey, with a stocking of rough bark	white to blue grey
Bark shedding pattern	in ribbons	in ribbons	small plates or large flakes
Juvenile leaves	ovate to orbicular, to 70 × 70 mm	ovate to spathulate, to 80 × 40 mm	broadly lanceolate to orbicular, 150 × 150 mm
Adult leaves	broadly lanceolate, to 79 × 38 mm, green, margins often crenulate	ovate, to 130 × 50 mm grey-green, margins entire	lanceolate, to 200 × 30 mm, margins entire
Buds per inflorescence	9–18	7	7–18
Operculum (L/B ratio)	2.5–3.0	1.25–1.75	2–3
Fruit	truncate-globular, disc broad, convex, valves strongly exserted	obconical, disc level, valves at rim level or slightly exserted	subglobular, disc broad, convex, valves strongly exserted
Position in canopy	understorey	top stratum	top stratum
Seedling stems	verrucose	verrucose	not verrucose
Bark oil glands	absent	present	absent
Seeds	black or brown, angular, not lacunose, hilum terminal	brown, not angular, lacunose, hilum ventral	black, angular, not lacunose, hilum terminal

Fig. 2. *Eucalyptus infera*: A. typical habitat, showing mallee form of plant. B. bark.

Conservation status: *Eucalyptus infera* is known only from the type locality, where it is locally common and occupies 40–50 hectares. The great bulk of this occurrence lies within State Forest, and the Queensland Forestry Department is planning to gazette a Scientific Area to protect this rare eucalypt species (W. Greasley, pers. comm.). Suggested conservation status is 2V based on Briggs and Leigh (1988).

Etymology: The specific epithet refers to the fact that this species grows as an understorey to other eucalypts, a situation which rarely occurs with *Eucalyptus* species. (Latin *inferus*: "lower, that which is beneath")

Acknowledgements

I wish to thank Mrs Jan Sked for providing the illustrations, and Mr Les Pedley for supplying the Latin diagnosis.

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Accepted for publication 1 September 1989

ACACIA ACRIONASTES (LEGUMINOSAE: MIMOSOIDEAE), A NEW SPECIES FROM SOUTH-EASTERN QUEENSLAND

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Summary

Acacia acrionastes **is described as new. It has close affinities with** ***A. floydii*** **and** ***A. betchei.*** **It is restricted to mountain peaks in south-eastern Queensland.** ***A. floydii*** **does not occur in Queensland.**

Acacia acrionastes Pedley, **sp. nov.** affinis *A. floydii* Tindale et *A. betchei* Maiden & Blakely ab illa phyllodiis plerumque aliquantum latioribus, glande foliari e basi phyllodii longius disposita, calyce apice pubescente, floribus in capitulo pluribus (12–16), petalis longioribus, seminibus brevioribus, areola inaperta; a hac phyllodiis plerumque longioribus glande non in medio disposita, lobis calycis non tandem separatis, legumine latiore, seminibus brevioribus latioribusque differt. **Typus:** Queensland. MORETON DISTRICT: Mt Maroon, lower slopes, 28°13′S, 152°44′E, February 1986, *R. Cummings* 5230 (holo: BRI).

A spindly tree to 8 m, vegetative parts glabrous; branchlets terete, sometimes slightly glaucous. Phyllodes linear, (6–)9–12.5(–17) cm long, 2–3(–4) mm wide, (25–)30–60 times as long as wide, tapering gradually from the middle to a point, rather thick in texture, without obvious secondary venation, wrinkled when dry; pulvinus c. 1 mm long; gland prominent, varying widely in position, commonly 10–25 mm from base of phyllode (1/5–1/9 of phyllode length from base). Heads of 12–16 flowers in axillary racemes, the axis c. 4.5 cm long, branches 10–15, each c. 5 mm long, all parts glabrous. Flowers pale; calyx turbinate, ± truncate, c. 0.7 mm long, pubescent in a narrow fringe at the top; corolla 1.5 mm long, the lobes free to about the middle; stamens c. 3 mm long; ovary glabrous, the style oblique, 3.5 mm long. Pod with up to 9 seeds, up to 10 cm long, 8–10 mm wide, raised slightly over the seeds and the margins sometimes a little indented between them; seeds arranged longitudinally, 4.5–5 mm long, 3 mm wide, pleurogram prominent, the areole large, open, funicle thickened into a clavate aril. **Fig. 1.**

Other specimens (all BRI): **Queensland.** MORETON DISTRICT: Mt Edwards, Jun 1938, *Smith* [AQ166903]; Mt French, 10 km SW of Boonah, alt. 300 m, Sep 1986, *Bird & King* [AQ406719]; ditto, Nov 1986, *Bird* [AQ431622]; Mt Maroon, on rocks near summit, Jan 1962, *Everist* 7032; Mt Ernest, Jan 1953, *Tyack Bake* [AQ166900]; Mt Lindesay, alt 1200 m, Oct 1932, *Stewart* [AQ166899].

Distribution and habitat: This species occurs on shallow rocky soils derived from rhyolite or basalt and among rocks on mountain peaks, up to 1200 m alt., in the south-eastern part of Queensland. These peaks have an unusual flora with several endemic species, for example *Pultenaea whiteana* S.T. Blake, *Comesperma breviflorum* Pedley and *Acacia saxicola* Pedley. The other species of the complex have restricted geographic ranges near the Queensland–New South Wales border, all on granite. *A. betchei* and *A. adunca* occur in the elevated country around Stanthorpe extending south to the northern part of the New England Tableland. *A. floydii* is found in somewhat wetter situations to the east of Tenterfield.

Phenology: This species flowers in July and August and fruits about November.

Etymology: Greek *akris, -os*, hilltop, peak, and *nastes*, an occupant; a reference to the habitat of the species. It should be treated as a noun functioning as an adjective (see Stearn, 1973, p. 98).

Notes: The affinities of *A. acrionastes* are with *A. betchei* and *A. floydii*. It differs from *A. betchei* in having usually longer phyllodes with the gland below the middle, calyx not splitting into spathulate lobes and wider pods with shorter, wider seeds. From *A. floydii* it differs in having usually longer phyllodes with the gland further from the base, calyx pubescent at the top, heads with more flowers, longer petals and shorter seeds with closed areoles. The 'mountain plants' referred to under *A. adunca* Cunn. ex G. Don in Pedley (1980, p. 286) are *A. acrionastes* and the specimen, *White* 7843, cited there is

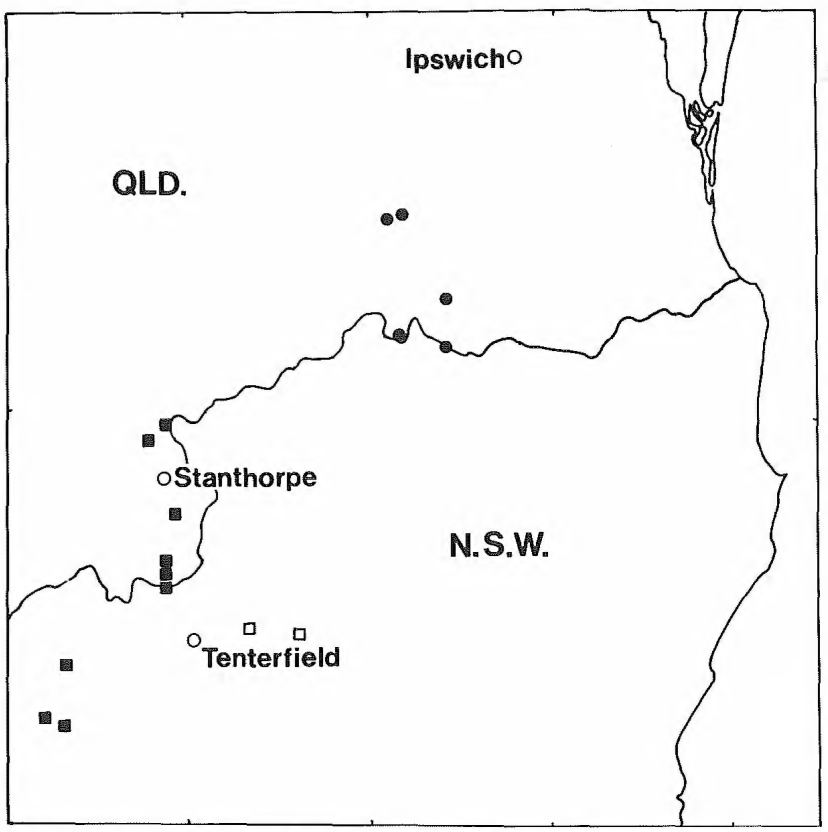
also *A. acrionastes*. The phyllodes of *A. adunca* are usually narrower and uncinate, and the flowers are a deeper yellow. The four species may be distinguished as follows:

1. Phyllodes uncinate, 1.5–2.5 mm wide, 40–70 times as long as wide, gland not overly prominent . . . . . **A. adunca**
   Phyllodes 1–4 mm wide, 22–65 times as long as wide, not uncinate, or if slightly so then gland prominent, exserted 2

2. Gland prominent, exserted, 3–15 mm from base of phyllode; heads of 8–12 flowers . . . . . **A. floydii**
   Gland not exserted or, if so, small, occasionally absent; heads of 12 or more flowers 3

3. Gland small and exserted, at about the middle of the phyllode, or absent; heads of 16–25 flowers, rarely 12; calyx at length splitting into spathulate lobes; pods 5–7 mm wide . . . . . **A. betchei**
   Gland not exserted, 10–25 mm from base of phyllode (c. 1/5–1/9 its length); heads of usually 12–16 flowers; calyx not splitting into free lobes; pods 8–10 mm wide . . . . . **A. acrionastes**

A. floydii was wrongly included in the checklist of Queensland species of *Racosperma* (Pedley 1987). The record was based on specimens of *A. acrionastes*. The rationale for referring *A. acrionastes* to *Acacia* rather than to *Racosperma* is given elsewhere (Pedley 1990).



Map 1. Distribution of *Acacia acrionastes* (●), *A. betchei* (■) and *A. floydii* (□).

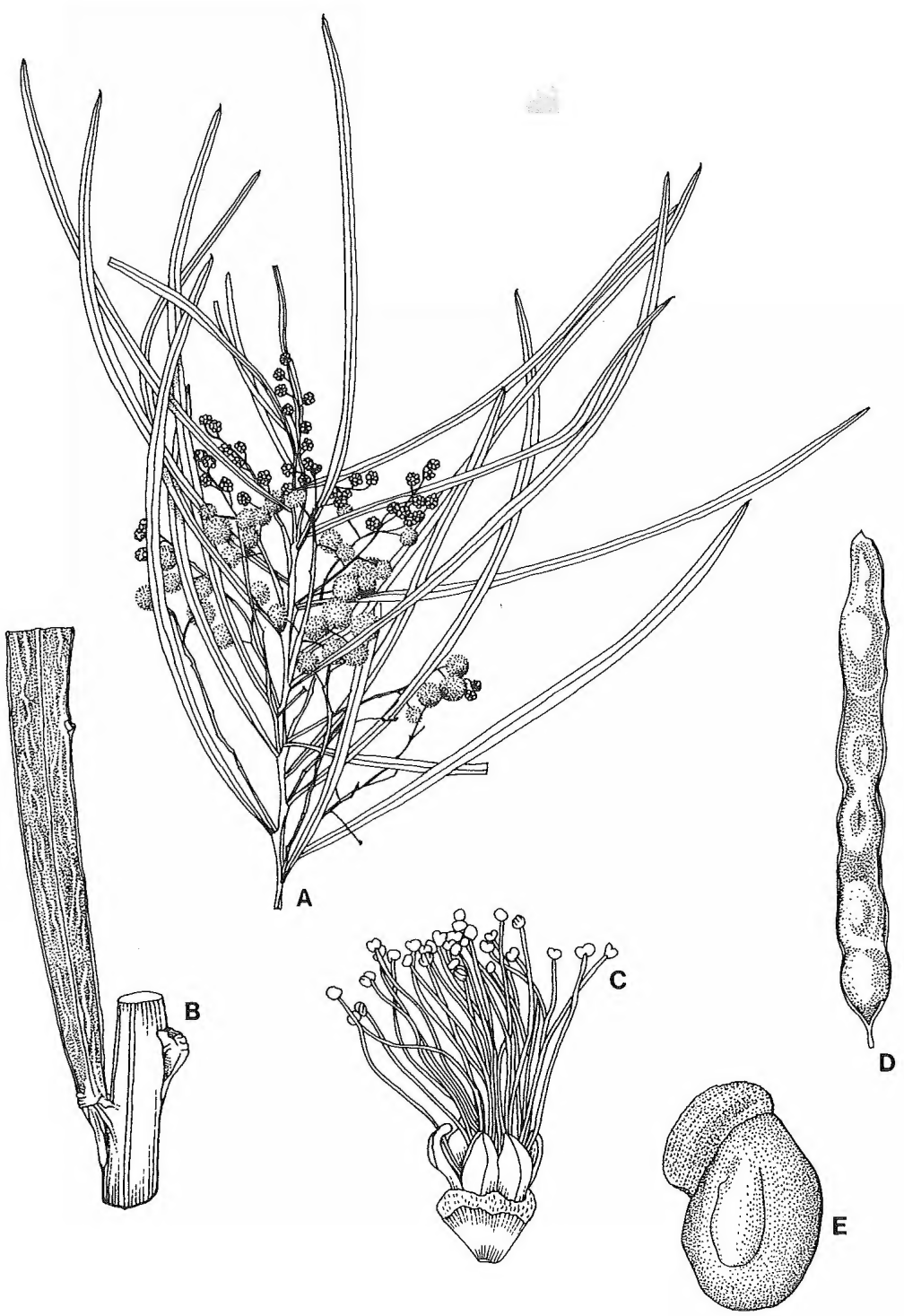


Fig. 1. *Acacia acrionastes*: A. twig × 0.75. B. base of phyllode showing position of gland × 4.5. C. flower × 12. D. pod × 0.75. E. seed × 6. A–C. Cummings 5230: D.E. Bird [AO4316221.

Acknowledgements

I am grateful to Dr Mary D. Tindale for examining specimens of *A. acrionastes* and giving me her opinion of their identity. The illustration and map are the work of Mr W.A. Smith.

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Accepted for publication 20 March 1990

Austrobaileya 3(2): 301–307 (1990)

OWENIA × *RELIQUA* (MELIACEAE), A NEW HYBRID FROM QUEENSLAND

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Summary

Individuals intermediate in characters considered diagnostic for *Owenia acidula* F. Muell. and *O. venosa* F. Muell. have been recorded for a number of localities in southern and central Queensland. These intermediate individuals are rarely encountered in the region where the two species are parapatric. There is no evidence of clinal gradation between *O. venosa* and *O. acidula*. The intermediate individuals are considered to be hybrids based on phenotypic and ecological evidence and are described as *O.* × *reliqua*.

Introduction

When Mueller (1857) described the genus *Owenia* he included four species, namely *O. acidula* F. Muell., *O. venosa* F. Muell., *O. cerasifera* F. Muell. (conspecific with *Pleiogynium timorense* (DC.) Leenh.) and *O. reticulata* F. Muell. Mueller (1862) added *O. vernicosa* F. Muell. and *O. xerocarpa* F. Muell. (treated as conspecific with *O. reticulata* by Bentham (1863)), and Domin (1927) described *O. capitis-york* from north Queensland.

In south-eastern and central Queensland, two species, *O. acidula* and *O. venosa*, have been recorded. The character most commonly used to distinguish these taxa is the number of leaflets per leaf, *O. acidula* having seven or more pairs of leaflets per leaf and *O. venosa* having three or four pairs of leaflets per leaf (Reynolds 1983). Other useful field characters by which the taxa can be distinguished are the light green to grey mature leaves and a tendency to sucker in *O. acidula* contrasted with dark green mature leaves and lack of a tendency to sucker in *O. venosa*. The flowers of both these species are very similar, but the mature fruit differ slightly in shape, those of *O. acidula* being globose-ovoid and those of *O. venosa* being globose. *O. acidula* is regarded as having a wide distribution over inland Queensland and reaches an eastern limit in the brigalow open forest/semi-evergreen vine thicket communities on black earths and related soil types as defined by Johnson (1984). *O. venosa* by comparison, appears to be restricted to south-eastern Queensland where it occurs in semi-evergreen vine thicket or araucarian microphyll vine forest on red krasnozem or related soil types.

During 1985, sterile material of an *Owenia* was collected south of Mundubbera (*Forster* 2241) that could not be satisfactorily placed to either *O. venosa* or *O. acidula* using the characters outlined above. The tree from which the specimen was taken had numerous suckers and leaves with five to seven pairs of leaflets that were intermediate in size between individuals of *O. venosa* and *O. acidula*. The plant was growing in *Eucalyptus crebra* open forest adjacent to cleared land formerly supporting brigalow open-forest. Similar plants (*Forster* 4828) were subsequently found in regrowth brigalow open-forest close by. Examination of herbarium material at the Queensland Herbarium revealed a small number of collections from central Queensland that also had this intermediate leaflet number and morphology.

Given the distinctiveness of both *O. venosa* and *O. acidula* the question arose whether these intermediate plants represented hybrids, part of a clinal intergradation between the two taxa, or a new species.

Materials and Methods

Collections of *Owenia* were made throughout eastern Queensland and herbarium collections at BRI, NE and QRS were examined. A selection of specimens examined for *O. acidula* and *O. venosa* is given in **Appendix 1.**

Leaf morphology: For each collection examined: (1) the maximum number of leaflets per leaf was determined, and (2) leaflet length and width were measured from the top

five leaflets on any leaf selected at random. Leaflet length was compared to leaflet width (**Fig. 1**) to determine whether or not continuous variation existed between *O. venosa*, *O. acidula* and those considered intermediate.

Floral morphology: Few herbarium collections of the two *Owenia* species at the herbaria listed above are fertile. Out of a total of 92 collections examined, some 14 possessed flowers and 19 had fruit. Collections of fresh flowers were fixed in 70% alcohol or dried flowers reconstituted by boiling in water with a touch of detergent, and comparative morphological measurements made (**Table 1**).

Results

Most herbarium and field collections are easily sorted to *O. venosa* or *O. acidula* by the colour of the dried leaves and leaflet shape and number (**Figs 1 & 2**). The flowers of all collections show little difference in a number of characters (**Table 1**). A number of collections cannot be equivocally placed with material of either *O. acidula* or *O. venosa* (**Fig. 2**), having foliage of a grey-green colour. These collections are also intermediate between *O. venosa* and *O. acidula* in terms of the leaflet number, leaflet length and width. The relationship between leaflet length and width is given in **Figure 1**. There is considerable variation in both *O. venosa* and *O. acidula* in these characters.

Based on herbarium records, parapatric populations of *O. venosa* and *O. acidula* have been recorded from the Biloela, Dalby, Theodore, Rockhampton and Mundubbera areas. Individuals of *O. acidula*, *O. venosa* and intermediate plants have been observed growing in close proximity in the Chinchilla area (D. & N. Hoy, pers. comm. 1989). In the Mundubbera area, no individuals of *O. venosa* or *O. acidula* were observed in the vicinity of the intermediate individuals, although both had been recorded from the general district (*Kent* [AQ347163] & *Forster* 3318).

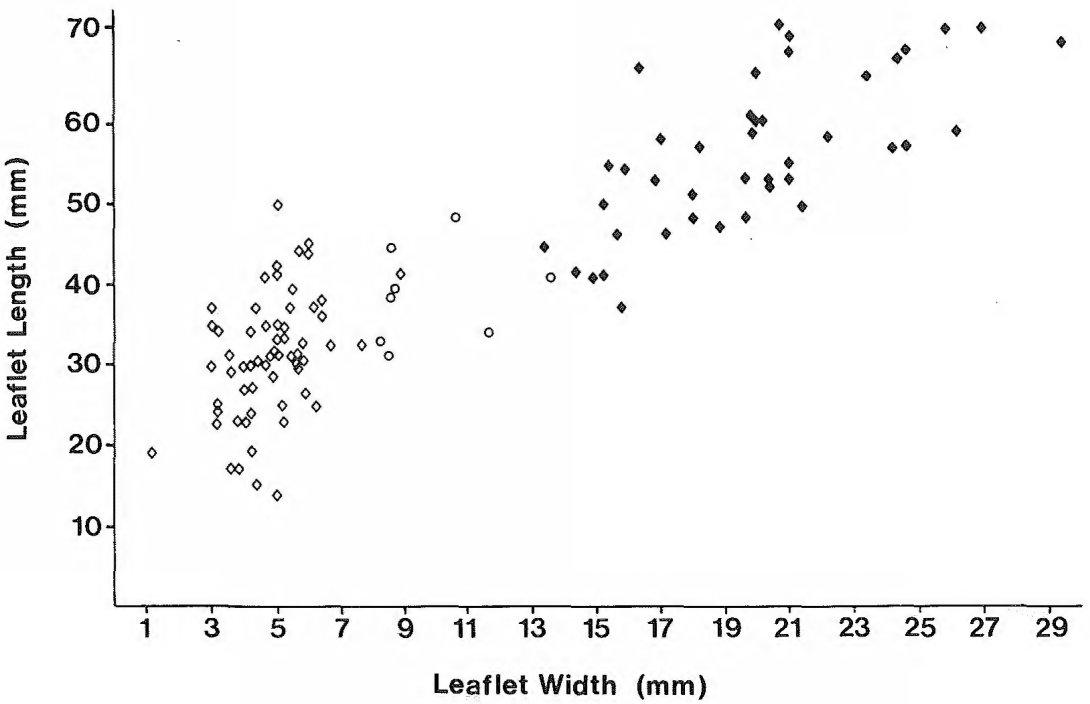

Fig. 1. Leaflet length versus leaflet width. ◇ *O. acidula*, ◆ *O. venosa*, ○ *O.* × *reliqua.*

Table 1. Comparison of morphological characters for *Owenia venosa*, *O. acidula* and *O.* × *reliqua*.

Character	*O. venosa*	*O.* × *reliqua*	*O. acidula*
suckers	absent	present	present
leaflet number	3–5	5–10	8–18
leaflet colour	dark green	grey-green	light green to grey
leaflet shape	elliptic-oblong to obovate-oblong	ovate-elliptic to linear-elliptic	narrowly linear to linear-ovate
leaflet length × width (mm)	36–75 × 13–30	30–50 × 7.5–14	10–52 × 1–9
panicle form	simple to thrysiform	simple to thrysiform	simple
pedicel length	c. 1 mm	c. 1 mm	subsessile
sepal length (mm)	2	1–2.5	2–2.5
petal length × width (mm)	4.5 × 2.5	4 × 2.5	3–4 × 2.5
staminal tube × width (mm)	3–4 × 2.5	2.5–3 × 2	2.5–3.5 × 2
anther number	8–10	7–10	8
fruit shape	globose	globose	globose -ovoid
number of locules	4	3	3

Discussion

The morphologically intermediate individuals described above (**Table 1, Figs 1, 2C**) are rarely encountered and only occur in regions where both *O. acidula* and *O. venosa* have been recorded or observed; therefore they do not represent clinal intergradation between these two species.

The area south of Mundubbera where these intermediate individuals of *Owenia* have been recorded is characterised by a complex mosaic of soils (de Mooy *et al.* 1977) with corresponding variation in the plant communities. Similar variation in soils and vegetation occurs in the Theodore and Biloela areas. Hence while *O. acidula* and *O. venosa* are usually well separated in south-east Queensland (**Map 1**), in these areas both taxa may occur parapatrically.

Mature individuals of *Owenia* species usually have a large number of fallen fruit beneath them, but this was not the case for the intermediate trees south of Mundubbera. A single fruit was observed on the largest of these individuals (c. 6 m high) in 1987. Whether this apparent low fruit production is a result of inherent low fertility or to failure of cross-pollination due to lack of available pollen sources is unknown.

The brigalow and semi-evergreen vine thicket communities in which these plants occur share many species or related species and are considered to be part of a structural and floristic gradation (Webb *et al.* 1984). It is probable that *O. venosa* and *O. acidula* are closely related and have radiated into different habitats while retaining the ability to interbreed, thus resulting in the hybrid formally described below.

Taxonomic Treatment

Owenia × reliqua P. Forster, **hybrida nov.** Hybrida naturalis ale *O. venosa* F. Muell. et *O. acidula* F. Muell. genita, foliolis 5–10, ovatis-ellipticis ad linearis-ellipticis, 1.5–5 cm longis et 7.5–15 mm latis, et cinereo-viridibus inter parentes intermedia. **Typus**: Queensland. BURNETT DISTRICT: 4 km NW of "Toondahra", 25°57′S, 151°21′E, November 1988, *P.I. Forster* 4829 (holo: BRI; iso: K,L).

Spreading tree to 6 m high, suckering at some distance from primary trunk, with greyish black, rough, scaly bark. Stems resinous when young, becoming lenticellate with age, glabrous. Leaves paripinnate, 6–12 cm long; rachis rarely winged even when young, c. 1 mm wide; leaflets sessile, in 5–10 opposite or subopposite pairs, coriaceous, narrowly linear-elliptic to ovate-elliptic, 1.5–5 cm long, 6–15 mm wide, glabrous, dull grey-green above, paler below; apex obtuse to acute; base cuneate; margin entire and somewhat recurved, midrib prominent; fine secondary reticulate venation prominent below. Inflorescence a thrysiform panicle, 2–6 cm long, with 1–many flowers. Flowers campanulate,

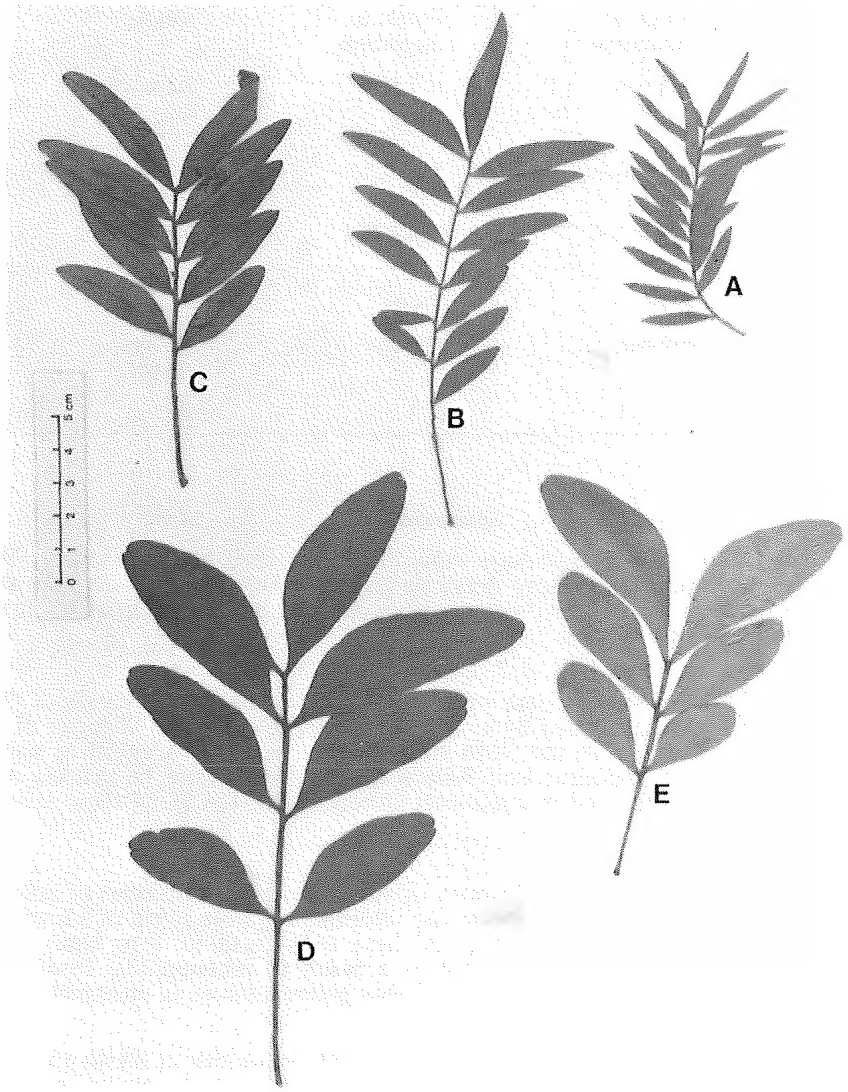

Fig. 2. Comparison of leaves from *O. venosa*, *O. acidula* and *O.* × *reliqua*. A. *O. acidula*. B. *O. acidula*. C. *O.* × *reliqua*. D. *O. venosa*. E. *O. venosa*. A, Forster 3602; B, Forster 3603; C, Forster 3314; D, Forster 3315; E. Forster 3308.

3–3.5 mm long, 2–2.5 mm diameter, sessile. Sepals 5, ovate, 1–2.5 mm long, c. 1.5 mm wide, green. Petals 5, ovate-oblong, c. 4 mm long and 2.5 mm wide, green. Staminal tube 2.5–3 mm long, c. 2 mm diameter, irregularly toothed and fringed at top, green. Anthers 7–10, narrowly oblong, 1.5–1.6 mm long, 0.4–0.5 mm wide, yellow. Stigma c. 1.6 mm long and 1 mm diameter, yellow. Fruit 3-locular.

Specimens examined. Queensland. LEICHHARDT DISTRICT: c. 20 km NNW of Moura, 3 km SE of "Bindaree", 24°22′S, 149°55′E, May 1984, *Thompson* [AQ440572] (BRI); "Martindale", Taroom Shire, Apr 1983, *Gray* [AQ393576] (BRI); Charvel, Theodore, *House* [AQ010656] (BRI). PORT CURTIS DISTRICT: c. 20 km NW of Biloela, May 1984, *Thompson* [AQ440571] (BRI); Experimental farm, Biloela, Oct 1947, *Smith* 3476 (BRI). BURNETT DISTRICT: 4 km NW of "Toondahra", 25°57′S, 151°21′E, Sep 1985, *Forster* 2241 (BRI,K); ditto, Dec 1987, *Forster* 3314 (BRI,QRS); 3 km WNW of "Toondahra", 25°58′S, 151°21′E, Nov 1988, *Forster* 4828 (BRI,K,MO).

Etymology: The epithet alludes to the predominantly relictual/remnant nature of the vegetation communities due to land clearing, in which both the hybrid and the parent species occur.

Acknowledgements

The Directors of BRI, NE and QRS allowed access to collections at their institutions. M.P. Bolton, Tropical Weeds Research Centre, Department of Lands, Charters Towers organised several trips on which material was collected. Special collections were made by G.I. Forster. Some material was collected on trips with P.D. Bostock, D.J. Liddle, D. Orford and M.C. Tucker. L.H. Bird and D. & N. Hoy provided information on the localities of some populations. R. Henderson corrected the latin diagnosis. Permits to collect were issued by the Queensland Department of Forestry for various lands administered by that Department. All of this assistance is gratefully acknowledged.

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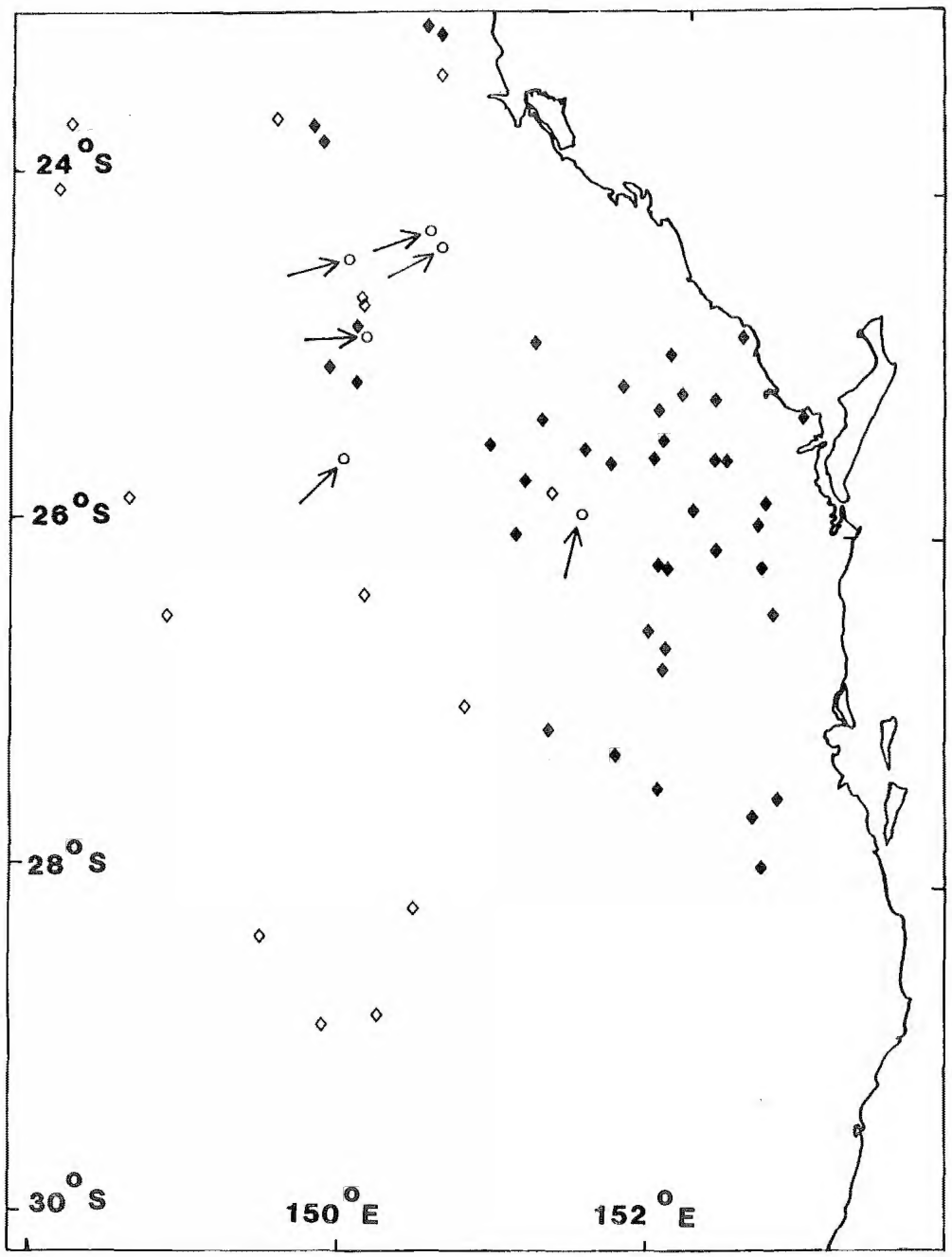
Appendix 1. Selected specimens.

Owenia venosa F. Muell.

Queensland. PORT CURTIS DISTRICT: Johnson Ck, 1 km N of Mt Etna, 23°09′S, 150°27′E, Jun 1989, *Forster* 5110 & *Vavryn* (BRI). LEICHHARDT DISTRICT: Isla Gorge, Aug 1973, *Sharpe* 655 & *Hockings* (BRI); W slopes of Gogango Range, c. 20 km ESE of Duaringa, 23°45′S, 149°51′E, Jun 1983, *Anderson* 3430 (BRI); near Ghinghindah, May 1977, *Olsen* 3576 & *Byrnes* (BRI). BURNETT DISTRICT: Hurdle Gully S.A. 33, Coominglah S.F. 1674, 24°54′S, 151°01′E, Jan 1988, *Forster* 3428 (BRI,K); 4.5 km NNE of Monogorilby, 26°01′S, 151°01′E, Dec 1987, *Forster* 3318 (BRI,DNA); Edenvale Hill near Kingaroy, Dec 1947, *Michael* 3084 (BRI). WIDE BAY DISTRICT: The Hummock, near Bundaberg, Dec 1938, *Goy & Smith* 614 (BRI); Kepnock, 24°52′S, 152°22′E, Oct 1948, *Smith* 4160 (BRI); Cordalba S.F. 832, 10 km NNE of Booyal, 25°08′S, 152°04′E, Jan 1988, *Forster* 3342, *Tucker & Orford* (BRI,K); Bellevue Scrub, Dundowran via Nickenbah, Jul 1928, *Tryon* [AQ060779] (BRI); Didcot Ck, 25°28′S, 151°54′E, Dec 1987, *Forster* 3315 (BRI,K,MO); Theebine, Nov 1921, *White* [AQ060783] (BRI); 15 km W of Gympie, 26°15′S, 152°40′E, Sep 1977, *Anning* CF1 (QRS); near Imbil, Jun 1947, *Smith & Webb* 3140 (BRI); DARLING DOWNS DISTRICT: Reserve 197, near Dalby, Dec 1943, *Jennings* [AQ060767] (BRI); Highfields, *Bailey* [AQ060778] (BRI). MORETON DISTRICT: S.F. 289 Yarraman, 26°49′S, 151°57′E, Nov 1973, *Moriarty* 1501 (CANB,QRS); Flinton Hill,Worlds End Pocket, 27°31′S, 152°45′E, Dec 1987, *Forster* 3308 (BRI,MEL); Pine Mt, Nov 1983, *Bird* [AQ419917] (BRI); Rosewood, May 1913, *White* [AQ060775] (BRI).



Map 1. Distribution of *Owenia acidula*, *O. venosa* and hybrids in south-east Queensland based on holdings at BRI, NE and QRS and field observations by the author. ◇ *O. acidula*, ◆ *O. venosa*, ○ *O.* × *reliqua*, highlighted by arrows.

Owenia acidula F. Muell.

Northern Territory. Gidyea Ck, Lake Nash, 20°58′S, 137°55′E, Oct 1955, *Michael* [AQ060744] (BRI,NE); "Murray Downs", Jul 1954, *Winkworth* 525 (BRI). **Queensland**. Cook District: between Petford & Dimbulah, 17°15′S, 145°00′E, Dec 1974, *Hyland* 7936 (BRI,QRS). Burke District: Nonda between Hughenden & Cloncurry, *Hubbard* 7248 & *Winders* (BRI); Hughenden, Nov 1935, *Blake* 10066 (BRI,CANB). Gregory North District: Carandotta, SE of Urandangie, Nov 1935, *Blake* 10174 (BRI,CANB). Gregory South District: Quilpie, Aug 1928, *Francis* [AQ060739] (BRI). North Kennedy District: 5 km from "Fletcher Dale", Charters Towers to "Hillgrove", Gregory Developmental Road, 19°52′S, 146°06′E, Mar 1988, *Forster* 3632 & *Bolton* (BRI); 2.5 km S of "Doongara", 20°35′S, 146°29′E, Mar 1988, *Forster* 3733 (BRI). Warrego District: c. 30 km by road N of Thargomindah, Jun 1955, *Smith* 6347 (BRI). Leichhardt District: Dysart, 22°05′S, 148°10′E, Aug 1977, *McConnell* 14 (QRS); 2 km S of Nipan saleyards, 24°47′S, 150°01′E, Mar 1988, *Forster* 3602 (BRI,K); Kianga Railsiding, 24°47′S, 150°01′E, Mar 1988, *Forster* 3603 (BRI,K). Mitchell District: 30 miles [50 km] SE of Barcaldine, Nov 1939, *Everist* 1926 (BRI). Maranoa District: Roma, May 1934, *Blake* 5827 (BRI). Burnett District: 34 km S of Mundubbera, Dec 1981, *Kent* [AQ347163] (BRI). Darling Downs District: "Kindon", 54 miles [90 km] NNE of Goondiwindi, Dec 1938, *Smith* 597 (BRI); 28 miles [47 km] N of Talwood, Oct 1970, *McDonald* 474 (BRI). **New South Wales.** Bullala S.F., Sheeba Downs turnoff, Jan 1988, *Mackay* [NE46140A] (NE); road to "Janbeth", c. 5 km NW of Bourke, 30°24′S, 145°54′E, Apr 1985, *James* 739 (BRI); Gurley, Nov 1914, *Breakwell* [AQ060746] (BRI).

Accepted for publication 1 February 1990

Austrobaileya 3(2): 309–317 (1990)

POMADERRIS LABILL. (RHAMNACEAE) IN QUEENSLAND, 1

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Summary

***Pomaderris clivicola* is described as new. The remaining Queensland species with indumentum on the upper leaf surfaces, *viz P. prunifolia* Cunn. ex Fenzl, *P. vellea* Wakef., *P. lanigera* (Andrews) Sims and *P. tropica* Wakef. are circumscribed and a key to the above species is given.**

Introduction

Little research on the genus *Pomaderris* Labill. has been published since Bentham's (1863) treatment in *Flora Australiensis*. Wakefield (1951) published a preliminary paper to validate names of 16 new Australian species and make three new combinations, but his promised monograph never eventuated. The species enumerated by Wakefield occur mainly in New South Wales and Victoria but five are also found in Queensland. More recently, Walsh (1988, 1989) has begun delineating taxa and clarifying the relationships of species in this genus in southern Australia. However botanists still have difficulty identifying some of the taxa occurring in Queensland due to an apparent intergrading of the characters that have been used to distinguish them in much of the literature. Wakefield (*loc. cit.*) distinguished some of his new species on apparently slight differences, though the distinctions seem to be consistent in southern states. However, in some cases, names that really only apply to species which have a very restricted range in southern areas have been misapplied to Queensland species, and different taxa have been lumped under the one name for convenience.

In Queensland, the genus, with approximately 15 named and four un-named representatives, is not considered to be of any ecomonic importance. Individual taxa are often rare and inconspicuous, being most often associated with rocky or poor areas of low nutrient availability. With such projects as the *Flora of Australia* being undertaken, it becomes timely for the taxonomy of this genus to be clarified. It is on this basis that the current studies are being undertaken, to deal primarily with Queensland species.

In addition to absolute measurements and shape, the characters most commonly used for distinguishing taxa have been the presence or absence of petals and the nature and length of the indumentum, particularly on the leaves and sepals (Wakefield 1951; Willis 1972; Beadle 1980; Ross 1986; Harden, in prep.). Until a phylogenetic study is carried out to clarify relationships, artificial groupings based on gross morphology are the most practical way to recognize and identify taxa. Therefore in this series of papers extensive use is made of these characters, since they are easily visible and measureable, though there is the risk of subjective assessment, particularly with density of indumentum. The indumentum of the species dealt with in this paper is illustrated in **Figures 1** and **2**. This first paper deals with the artificial group of species which have hairs on the upper surface of their leaves; subsequent treatments will deal with those with glabrous upper leaf surfaces.

Most taxa (and all new taxa) dealt with here have been studied in the field. Herbarium specimens from BRI and selected specimens from NE and NSW were studied and the species descriptions were compiled from these. The NSW specimens were obtained on loan after examining NSW's holdings *in situ*. Type specimens from BRI, NSW and MEL were also examined. SEM photographs of the leaf surfaces of *Pomaderris clivicola* were taken to ascertain the nature of the indumentum. Classification of the basic plant structural formations used in the ecological discussions is that of Specht (1981), and that of Webb (1978) is used for closed forest.

Key to *Pomaderris* in Queensland (species with pubescent upper leaf surfaces)

1. Leaf margins toothed; upper leaf surface scabrous with stout, simple or rarely basally divided trichomes, lower with stellate or dendritic trichomes . . . . . **1. P. prunifolia**
   Leaf margins entire; upper leaf surface not scabrous, lower with simple trichomes overlying very short, stellate trichomes 2

2. Upper leaf surfaces with a dense, rarely sparse, indumentum of simple trichomes 3
   Upper leaf surfaces with a very dense indumentum of minute stellate trichomes 4

3. Lower leaf surface with a very dense (velutinous) indumentum of simple curly trichomes c. 0.5–0.6 mm long . . . . . **2. P. vellea**
   Lower leaf surface with a very dense indumentum of minute stellate trichomes overlain by a moderately dense layer of simple wavy, curly or crinkly trichomes 0.5–2.0 mm long . . . . . **3. P. lanigera**

4. Petioles 6–13 mm long; receptacle c. 1 mm long; staminal filaments c. 1.5 mm long; anthers 0.3–0.4 mm long . . . . . **4. P. tropica**
   Petioles 2.5–4.5 mm long; receptacle c. 0.5 mm long; staminal filaments 2–2.5 mm long; anthers c. 1 mm long . . . . . **5. P. clivicola**

1. Pomaderris prunifolia Cunn. ex Fenzl in Endl., Enum. Pl. Hueg. 22 (1837). **Type:** New South Wales ad Bathurst, *Cunningham* (holo: ?W *n.v.*).

Erect shrub 2–3 m tall. Twigs slender, pubescent with translucent and/or ferruginous dendritic trichomes, glabrescent, then bark purplish brown. Leaf laminas ovate, occasionally oblong-elliptic, 16–47 mm × 8–21 mm; apex blunt, obtuse, or toothed appearing acute, base cuneate to rounded, margin toothed; midrib and primary lateral veins sunken above, secondary obscure, midrib raised below, primary veins 6–9 on each side, c. 45° to midrib, raised, generally ending at margin with a tooth, ± straight or slightly looping; scabrous above with stout simple or rarely divided trichomes c. 0.3–0.5 mm long, densely pubescent below with translucent stellate and dendritic trichomes c. 0.3–0.4 mm long and also sparsely to moderately densely covered with 'stalked' dendritic trichomes 0.4–0.5 mm long, especially on veins; dull dark green above, pale to ± ferruginous below. Petioles 4–9 mm long, indumentum as for twigs. Stipules very narrowly triangular to ± linear, 3.5–8 × c. 0.5 mm, attenuate, margin membranous, irregularly toothed; pubescent with dendritic trichomes on back. Inflorescences terminal cymose panicles 1–3 cm × 1.5–2 cm; pedicels 1–2 mm long, with indumentum of translucent stellate trichomes; bracts orbicular, 3–4 × 2–4 mm, obtuse, concave, margin membranous, to 1 mm broad apically; receptacle and sepals densely pubescent with translucent stellate trichomes c. 0.3 mm long, and moderately densely pubescent with translucent to occasionally ferruginous simple trichomes up to 1 mm long, denser on receptacle. Receptacle obconical, c. 1 mm long. Sepals c. 1.5–2 mm long, oblong-ovate, acute. Petals absent. Staminal filaments 1.5–2.5 mm long, anthers dorsifixed, 0.75–1 mm long. Style 3-fid, column c. 1 mm long, lobes 0.5–0.75 mm long, stigmatic surface extending along side of lobes; summit of ovary densely pubescent with straight, simple trichomes c. 1 mm long. Capsules 3-valved, obconical, 2.5–3 × 1.5–2 mm, indumentum as for flower, becoming sparser with age; seeds brown, oblong-ovoid, sometimes slightly compressed dorsiventrally, 1.5–2 × c. 1 mm.

Selected specimens: Queensland. DARLING DOWNS DISTRICT: Stanthorpe, Sep 1930, *Westcott* 36 (BRI); Wyberba, Oct 1958, *Hockings* [AQ109689] (BRI); Gully N of Bald Mtn, SW side of Girraween NP, Sep 1974, *McDonald* 449 (BRI). **New South Wales.** NORTHERN TABLELANDS: Creek below Waa Gorge, Mt Kaputar NP, Oct 1978, *Harden* s.n. (NE); Old Booralong run past Back Ck nr Guyra, Jul 1930, *McKie* W35 (BRI); 18 km SSE of Hillgrove on Long Point Road, Oct 1972, *Williams* s.n. (NE); 19 km by road SSE Hillgrove, Chandler R. Gorge, Oct 1972, *Williams* s.n. (NE). CENTRAL TABLELANDS: Bathurst N.S.Wales, Dec 1825, *Cunningham* 16 (BRI).

Distribution and habitat: Southern Queensland in the Granite Belt (Stanthorpe and Wallangarra areas), south to Victoria; on rocky slopes or the edges of gorges, often along creeks in these areas, in open-forest.

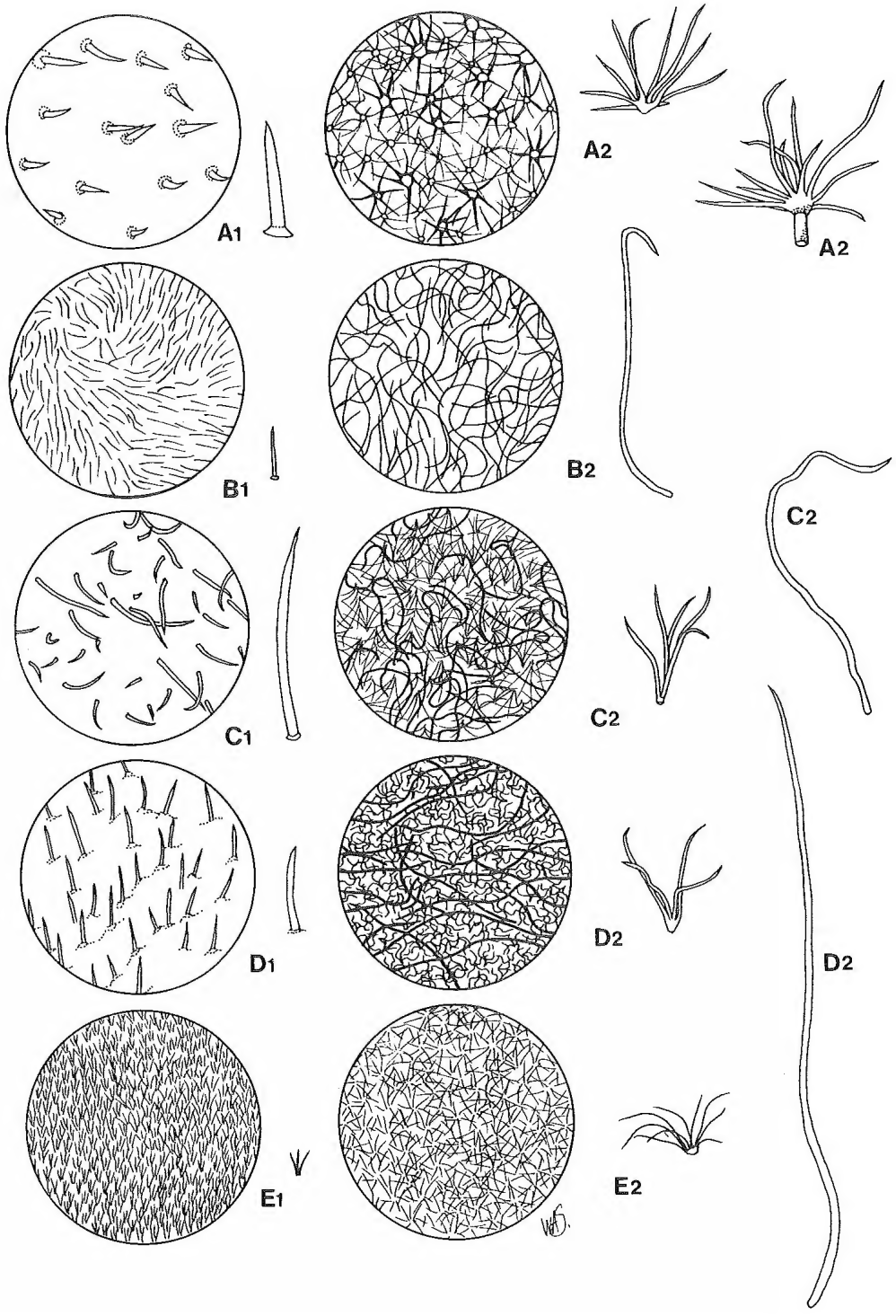

Fig. 1. Trichome types: 1. Upper surface. 2. Lower surface. A. *P. prunifolia*. B. *P. vellea*. C. *P. lanigera*. D. *P. lanigera* form 4. E. *P. tropica*. All surfaces × 25; individual trichomes × 50.

Phenology: Flowers have been recorded from July to October, fruits November and December.

Affinities: This species appears to have no close relatives in Queensland, but seems closest to *P. betulina* Hook., a species which occurs in southern New South Wales and Victoria. *P. prunifolia* is easily distinguished from other species occurring in Queensland by the toothed margins on the leaves, and by the dendritic trichomes on their lower surface.

Conservation status: The species is locally common in rocky habitats, is represented in at least two national parks, and does not appear to be endangered.

2. Pomaderris vellea Wakef., Vict. Nat. 68(8): 142 (sphalm. 141) (1951). **Type:** Torrington, October 1911, *J.L. Boorman* (holo: NSW!; iso: MEL!).

Erect shrub to c. 2.5 m tall. Twigs slender, densely pubescent with simple curly greyish trichomes, often ferruginous near the tip, eventually glabrous and then twigs purplish, lenticellate. Leaf laminas oblong to ovate-oblong, 12–75 × 8–27 mm, apex obtuse, sometimes retuse, usually mucronate, base rounded, margin entire; midrib sunken above, primary lateral veins ± obscure, midrib raised below, primary lateral veins 8–14 on each side, angle to midrib greater than 60°, ± parallel, looping just inside the margin; above densely velutinous with simple, ± straight (occasionally basally divided) translucent trichomes c. 0.2 mm long, below very densely pubescent with simple curly trichomes c. 0.5–0.6 mm long, both translucent and ferruginous; dark dull grey-green above, ferruginous below, darker on the veins. Petioles 5–12 mm long, indumentum as for the twigs. Stipules ovate-oblong to very narrowly triangular, 3.5–5 × 0.75–1.5 mm, acuminate, margin toothed, teeth patent, pubescent on back with white trichomes, longer simple ferruginous ones on keel and margins. Inflorescences dense terminal cymose panicles 2–5 × 3–6 cm; pedicels 1.5–4 mm long, with very dense indumentum of translucent ± straight spreading trichomes 0.5–1 mm long; bracts orbicular, 3–4.5 × 3–4.5 mm, obtuse, margin membranous, up to 1.5 mm wide apically, pubescent on back with simple antrorse trichomes up to 0.5 mm long; receptacle and sepals very densely pubescent with translucent ± straight trichomes 0.6–1 mm long, spreading on receptacle, ± antrorse on sepals. Receptacle obconical, 1.5–2 mm long. Sepals oblong-ovate, 2.5–3 mm long, acute. Petals 2–2.5 mm long, clawed, claw c. 1.2–1.5 mm long, with 1 or 2 trichomes along it, blade obovate to ovate, c. 1 mm long, attached at base of staminal filament, upper margin usually unevenly serrate or minutely erose. Staminal filaments c. 3.5–4 mm long, anthers dorsifixed, 1–1.5 mm long. Style deeply 3-fid, column c. 1 mm long, lobes c. 2 mm long, stigmas ± capitate, extending slightly down one side; summit of ovary densely pubescent with straight, simple mostly ferruginous trichomes 1–1.5 mm long. Mature capsules not seen.

Selected specimens: Queensland. DARLING DOWNS DISTRICT: Stanthorpe, undated, *Bernays* [AQ109731] (BRI); Wallangarra, Sep 1919, *Bell* [AQ109730] (BRI). **New South Wales.** NORTHERN TABLELANDS: Dangar's Falls nr Armidale, Oct 1971, *Williams* s.n. (NE); Moona Falls area, E of Walcha, Sep 1976, *Williams* s.n. (NE).

Distribution and habitat: Southern areas of the Granite Belt in Queensland south to the Hunter Valley area of New South Wales; generally on rocky outcrops or rocky slopes on shallow soils, in open-forest or open-scrub.

Phenology: Flowers have been recorded from September to November.

Affinities: *P. vellea* could possibly be confused with an obtuse-leaved form of *P. lanigera* which occurs on the Granite Belt in southern Queensland. However it can be distinguished from the latter species by the dense velvety indumentum on the upper leaf surface and the single layer of moderately long curly trichomes on the lower leaf surface.

Conservation status: Although of restricted occurrence in Queensland, it occurs over quite a large area in New South Wales, and can be locally common in suitable habitats. It is not considered to be endangered.

3. Pomaderris lanigera (Andrews) Sims, Bot. Mag. 43: t. 1823 (1816); *Ceanothus laniger* Andrews, Bot. Repos. 9: t. 569, col. (1809). **Type:** based on plant cultivated in London, not preserved; lecto (here designated): H. Andrews, Bot. Repos. 9: t. 569, col. (1809).

Pomaderris ferruginea var. *pubescens* Benth., Fl. aust. 1: 417 (1863). **Type:** Illawarra, *Shepherd* (syn: MEL!).

Erect often multistemmed shrub up to 2(rarely 3) m tall. Young branchlets ferruginous to greyish pubescent with short stellate translucent trichomes overlaid by wavy or crinkly trichomes 0.7–1(–1.5) mm long, eventually glabrescent and then purplish, lenticellate. Leaf laminas narrowly oblong-ovate, narrowly ovate, oblong or ovate, 21–126 × 9–41 mm, apex acute or occasionally blunt, rarely obtuse, mucronate, base rounded, margins entire or somewhat undulate; midrib impressed above, primary lateral veins visible when dried but not prominent, below midrib raised, primary veins (6–)9–14 on each side of midrib, angle 45–60° to midrib, looping towards margin, sometimes almost parallel, reticulation usually obvious between them; indumentum moderately dense (rarely sparse) above, with straight simple trichomes 0.25–0.5 mm long, very densely pubescent below with short translucent stellate trichomes with a moderately dense to dense (rarely sparse) overlay of longer curly or wavy translucent or often ferruginous trichomes 0.5–1(–2) mm long, particularly on veins. Petioles 4–15 mm long, indumentum as for twigs. Stipules ovate to broadly ovate, 5–8.5 × 3.5–6.5 mm, acuminate tip 1 mm long, margin distantly but regularly toothed, teeth patent, often obscured by hairs on margin, pubescent on back with long simple trichomes on midvein and margin. Inflorescences relatively open, terminal and upper axillary cymose panicles, 2 × 3 cm – 11 × 13 cm, indumentum as for twigs; pedicels (1.5–)2–4 mm long, indumentum dense, of short stellate trichomes and longer white simple trichomes to c. 0.5 mm long; bracts broadly ovate, membranous, 4–5 × 3–3.5 mm, acuminate, margin and back hairy, receptacle obconical, 1–1.5 mm long, indumentum as for pedicel but simple trichomes up to 1(–1.5) mm long, moderately dense; sepals 1.5–2.5(–3.2) mm long, 0.75–1(–1.5) mm wide, yellow inside, whitish pubescent outside with very short dense stellate trichomes and scattered longer simple trichomes 0.5–1(–1.5) mm long; petals yellow, narrowly to broadly spathulate, to fan-shaped, clawed, total 1.5–2(–2.5) mm long, claw 1–1.2(–1.5) mm long, blade 0.6–0.8(–1.5) mm long, margin erose or uneven, claw attached to stamen in lowest 0.2 mm; staminal filaments 2–2.5(–3.5) mm long, anthers dorsifixed, 0.6–1(–1.5) mm long; style 3-fid, united part 1–1.3 mm long, lobes 0.75–1.4 mm long, stigmas club-shaped; summit of ovary pubescent with straight translucent trichomes 0.6–0.8(–1.5) mm long. Capsules obovoid, 3.5–4(–4.5) × 2.5–3 mm; seeds shiny, oblongoid, rounded dorsally, keeled ventrally, 2–2.5 × 1.2–1.5 mm.

Selected specimens: Queensland. LEICHHARDT DISTRICT: Isla Gorge, c. 28 km SW of Theodore, Aug 1973, *Sharpe* 497 & *Hockings* (BRI); Carnarvon Ck, National Park 'Hell-hole Gorge', Jul 1961, *Gittins* 313 (BRI); Blackdown Tableland, c. 35 km SE of Blackwater, Sep 1971, *Henderson* 1032, *Durrington* & *Sharpe* (BRI; MEL *n.v.*). MARANOA DISTRICT: Mt Moffatt, 25°01′S, 147°57′E, Sep 1986, *Williams* 86033 (BRI). BURNETT DISTRICT: 'Manar', 45 km SSE Mundubbera, Sep 1984, *Forster* 1884 (BRI); ditto, Nov 1984, *Forster* 1950 (fruit) (BRI). DARLING DOWNS DISTRICT: 52 km N of Warrego Hwy on Auburn rd, 26°22′S, 150°43′E, Nov 1984, *Rodd* 4174 & *Hando* (BRI,NSW; MEL *n.v.*); Girraween NP nr Wyberba and Wallangarra, Sep 1971, *Ryan* [AQ0003354] (BRI). MORETON DISTRICT: Glasshouse Mts: on Mt Beerwah, Mar 1968, *Smith* [AQ109652] (BRI); 2 km E of Swanbank Power Station, Bundamba, 27°3-′S, 152°43′E, Sep 1984, *Bird* [AQ395632] (BRI); 1 km SW Greenwood Village, Redbank Plains, Oct 1988, *Bird* (BRI); Mt Maroon, Sep 1939, *Goy & Smith* 715 (BRI); Mt Barney, Aug 1931, *White* 7839 (BRI); Nr Picnic Ck and Surprise Rock, Lamington NP, Aug 1960, *Blake* 21357 (BRI). **New South Wales.** NORTH COAST: Koonyum Ra. 6.4 km W of Mullumbimby, Aug 1973, *Coveny* 5005 (BRI,NSW). NORTHERN TABLELANDS: Gibraltar Ra. c. 74 km NE of Glen Innes, Nov 1967, *Williams* s.n. (NE); Gibraltar Ra. NP, 64 km NE of Glen Innes, Sep 1967, *Williams* s.n. (NE).

Distribution and habitat: Southern and central Queensland, New South Wales and Victoria, usually on sandstone derived or poor sandy or shaly soils, on hillsides or near or along creeklines, or in rocky or heathy areas near cliffs, growing in soils derived from volcanic rock types such as rhyolite and granite.

Phenology: Flowers have been recorded from July to October; fruits have been recorded October to December.

Conservation status: This species is widespread and can be locally common in suitable habitats, and has been recorded in gazetted National Parks, e.g. Carnarvon NP. It is not considered to be endangered.

Notes: The taxon known as *P. lanigera* exhibits a great deal of variation and at least four forms can be fairly easily distinguished:

1. A form which has narrowly ovate acute leaves with a dense overlay of simple wavy trichomes up to 1 mm long, a compact to open inflorescence, floral parts with simple, often crinkly trichomes 0.5–1 mm long, and sepals 2–2.5 mm long. This form is found mainly in coastal southern Queensland, New South Wales and Victoria but has also been recorded from the Stanthorpe district.

2. A form which has narrowly oblong-ovate, narrowly oblong or occasionally oblong leaves with a sparse to moderately dense overlay of simple, often crinkly trichomes up to 1 mm long, an open inflorescence, floral parts with simple trichomes 0.5–1 mm long and sepals 1.5–2 mm long. This form is found mainly in subcoastal southern Queensland to central inland Queensland, e.g. Bundamba, near Brisbane, south-east of Mundubbera and Carnarvon and Isla Gorges, usually on sandstone or poor sandy soils though one locality record mentioned granite derived soils as a substrate.

3. A form which has consistently very short, oblong obtuse leaves, but otherwise with dimensions as for the above forms. This has been found only in the vicinity of Wyberba on the Granite Belt. Other forms have scattered leaves of this shape.

4. A form with ovate acute leaves, distinctly longer simple trichomes on both the lower leaf surfaces (1–2 mm long) and the floral parts (1–1.5 mm long), generally small, compact inflorescences, at least in flower, and larger flowers (sepals 2.5–3.2 mm long) and fruit. This form has been recorded from the volcanic outcrops of southern Queensland, *viz* Mt Beerwah, Lamington National Park, Mt Barney, Mt Maroon, Crows Nest area, and the Granite Belt, and corresponding areas in New South Wales, such as Gibralter Range and possibly further south to southern New South Wales.

These forms intergrade somewhat, as the ranges of a number of the traditional distinguishing characters, such as flower size, density of simple trichomes on the lower leaf surface, degree of "curliness" of the simple trichomes, and habitat preference, overlap. However Form 4 has consistently longer indumentum and larger flowers, and is possibly worthy of distinction at varietal rank.

There is, unfortunately, some doubt as to which of these four taxa Andrews' name correctly applies. The only known element from the original material is the illustration in his *Botanical Repository* which is formally lectotypified here. According to Stafleu and Cowan (1976) "no herbarium specimens [of Andrews'] are known to exist", and a thorough check of K and BM material failed to locate any under *Ceonothus laniger* or *Pomaderris lanigera* (pers. comm. T. Macfarlane).

Andrews' illustration certainly matches the material I have included in Form 1, which appears to be the common form in southern Australia. However there is a possibility that plants of Form 4 also occur on volcanic outcrops north and south of Sydney. Both forms could be possible sources of plants, or seeds from which plants were grown, from which Andrews took his specimen to prepare his illustration. In order to correctly apply the name to a particular population, it would be necessary to conduct a thorough study of south-eastern Australian populations, and the history of exploration of the Sydney region during the first 30–35 years of settlement, to ascertain the most probable locality from which Andrews' material came.

Bentham (1863) cites several syntypes for *P. ferruginea* var. *pubescens*, only one of which I have seen. This name is included in synonymy here on the basis of that specimen.

4. Pomaderris tropica Wakef., Vict. Nat. 68(8): 141 (sphalm. 142) (1951). **Type:** Queensland. COOK DISTRICT: Walsh's Pyramid, N.Q., 7 August 1938, *H. Flecker* (N.Q.N.C. No 5060) (holo: BRI!).

Shrub 2–3 m tall. Twigs slender, pubescent with very short stellate trichomes c. 0.1 mm long overlain by numerous longer simple trichomes c. 0.4–0.5 mm long, glabrescent. Leaf laminas ovate to elliptic, 24–84 × 14–33 mm, apex obtuse, mucronate, very rarely subacute, base cuneate, margin slightly incurved when dry; midrib sunken above, primary

lateral veins generally obscure, midrib raised below, 9–16 primary lateral veins on each side of midrib, at angle of 45–50° to midrib, ± parallel, looping to margin; indumentum above very densely velvety, of stellate trichomes c. 0.1 mm long, below very densely pubescent with curved simple trichomes 0.2–0.3 mm long overlain by a moderately dense indumentum of appressed ± straight simple trichomes 0.5–0.7 mm long, trichomes translucent or with slightly ferruginous pigment in straight trichomes mainly along veins and margins; dull dark green above, undersurface pale creamish, veins darker. Petioles 6–13 mm long, densely pubescent as for twigs. Stipules narrowly triangular, 4.5–5.5 × 1–2 mm, long attenuate, margin regularly toothed, acutely keeled, pubescent on back with ferruginous trichomes, caducous. Inflorescences terminal cymose panicles 2.5 × 4 cm – 4 × 7 cm; pedicels 2–4 mm long; indumentum on pedicels, receptacle and sepals as for twigs; bracts narrowly spathulate, 3–4 × 0.75–1 mm, abruptly acuminate, margin membranous, pubescent on back with simple trichomes. Receptacle obconical, c. 1 mm long. Sepals oblong-ovate, acute, c. 2 × 1 mm. Petals absent. Staminal filaments c. 1.5 mm long, anthers dorsifixed, c. 0.3–0.4 mm long. Style 3-fid, column c. 0.5 mm long, lobes c. 0.5 mm long, stigmas capitate; summit of ovary densely covered with long simple trichomes c. 0.7 mm long. Fruits ellipsoid to ellipsoid-obovoid, 3–3.5 mm long, densely pubescent with mainly long trichomes; seeds matt brown with black at the hilum, ± oblongoid, c. 2.5 × 1.5 mm, rounded dorsally, keeled ventrally.

Selected specimens: Queensland. Cook District: Walsh's Pyramid, N slopes, Nov 1954, *Blake* 19768 (BRI; K,MO,PERTH,SP,US *n.v.*); Walsh's Pyramid, 17°12′S, 145°48′E, Sep 1972, *Webb & Tracey* 13781 (BRI,QRS).

Distribution and habitat: Restricted to Walsh's Pyramid, North Queensland, in narrow crevices and drainage lines on exposed rock faces on the sides of the mountain.

Phenology: Flowers have been recorded from August to November; fruits have been collected October and November.

Conservation status: This species has been recorded only from a population at the type locality. The area is included in a National Park. Suggested code is 2RC using the criteria of Briggs and Leigh (1988).

5. Pomaderris clivicola E. Ross, **sp. nov.**, differt *P. cinerea* Benth. foliis ovatis, pagina inferna foliorum et sepalis extus trichomatibus longis simplicibus superantibus trichomata brevissima densa, velutina stellata, antheris filamentisque longioribus, et ramis styli glabris; differt *P. tropica* Wakef. foliis parvioribus, pagina inferna foliorum trichomatibus paucioribus simplicibus, sepalis brevioribus, antheris filamentisque longioribus. **Typus:** Queensland. Burnett District: 4.5 km S of Binjour, Humphrey road, 4 January 1990, *P.I. Forster* 6184 (holo: BRI; iso: BRI,CANB,K,MEL,NSW, distribuendi).

Multistemmed shrubs 3–4 m tall; bark tessellated at base; stems ascending, glabrous, purplish brown, lenticels numerous. Twigs slender, densely pubescent with short trichomes c. 0.1–0.2 mm long overlain by numerous simple trichomes c. 0.5 mm long becoming sparser down the twig. Leaf laminas ovate, 15–32 × 6–12 mm, occasionally smaller, apex tapered to a blunt often mucronate point, base cuneate, margin flat to slightly incurved when dry, midrib sunken above, 1–2 pairs of primary lateral veins slightly sunken above, others obscure, midrib raised below, 4–8 primary lateral veins visible on each side of the midrib, at angle of 45–60° to midrib, raised, looping towards margin; indumentum above very dense velvety, of clustered or stellate trichomes c. 0.1 mm long, below very densely pubescent with simple curved trichomes c. 0.2 mm long overlain by a moderate indumentum of simple ± straight trichomes 0.5–0.7 mm long, trichomes translucent or occasionally towards tips of unexpanded leaves, long straight trichomes ferruginous; dull greyish green above, below pale greenish white. Petioles 2.5–4.5 mm long, indumentum as for twigs. Stipules narrowly triangular, 2–3 × 0.6–0.75 mm, acuminate, margin regularly toothed, pubescent along keel on back. Inflorescences small terminal cymose panicles 7–20 × 7–17 mm; pedicels (1–)2–3 mm long, pubescent as for twigs; receptacle and outside of sepals with dense indumentum of short trichomes overlain by moderately dense layer of longer straight trichomes; bracts obovate to broadly obovate, c. 1.5 × 1.2 mm, caducous. Receptacle obconical, c. 0.5 mm long. Sepals yellow to cream inside, oblong-ovate, 1.2–2 × c. 0.75 mm, apex acute. Petals absent. Staminal filaments 1.5–2.5 mm long, anthers dorsifixed, 0.6–1 mm long. Style deeply 3-fid, column c. 1 mm long, branches 0.5–1 mm long, stigmas capitate; summit of ovary densely

pubescent with long simple trichomes. Capsules ovoid, c. 2 mm long, pubescent with dense short and moderately dense long trichomes; seeds ± ellipsoid, outer side curved more than the inner, c. 2 × 1 mm. **Fig. 3.**

Selected specimens: Queensland. BURNETT DISTRICT: MUNDUBBERA 9146–443724, 4.5 km S of Binjour, Binjour Plateau, Dec 1987, *Forster* 3322 (BRI,CANB,K,MEL,NSW); 4.5 km S of Binjour on road to Humphrey, Mar 1988, *Ross* 8802 & *Forster* (BRI).

Distribution and habitat: Known only from the type locality* on the Binjour Plateau, south-eastern Queensland, where it grows on a steep south-facing slope, in red soils, below outcropping rock. The plants form part of the understorey in simple semi-evergreen vine thicket.

Phenology: Flowers were collected December-January after some rain in the area; at other times of the year when the site was visited (March, October, November) only buds were noted. Capsules were recorded January to March.

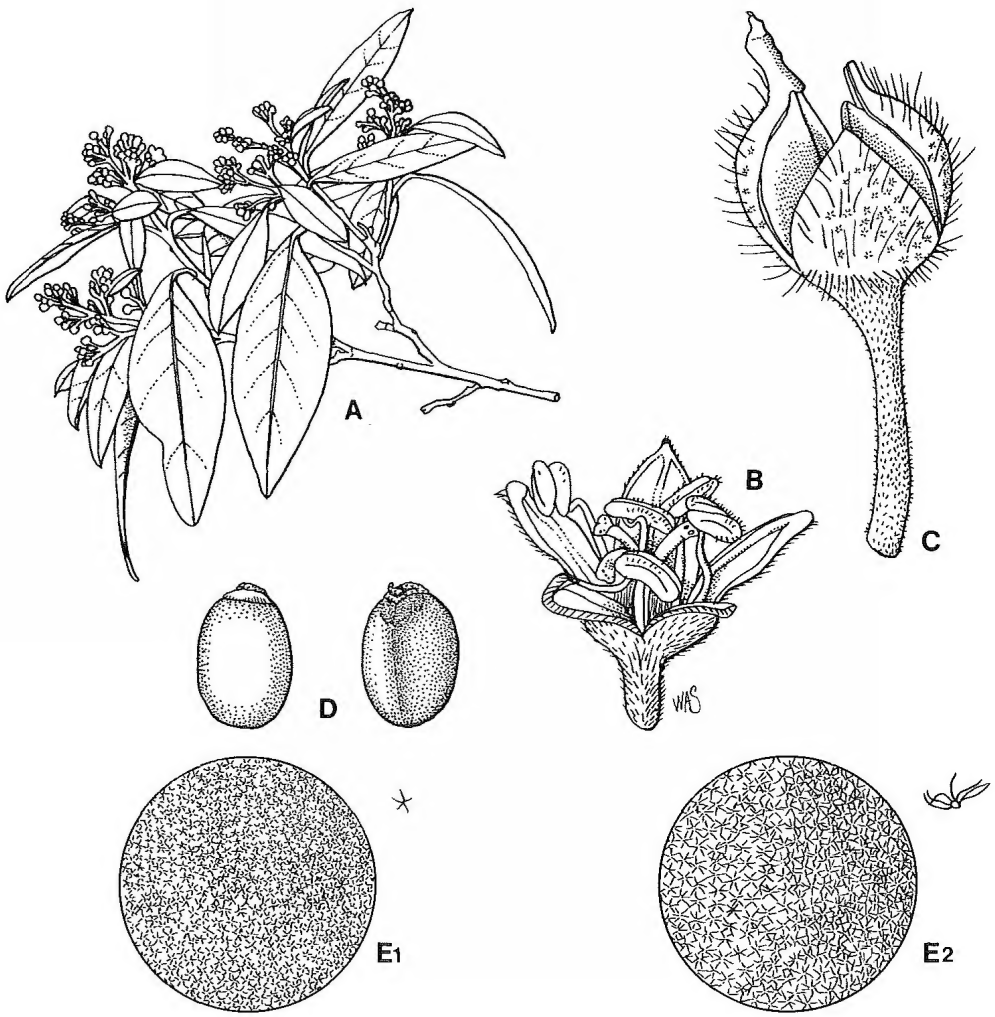

Fig. 2. *P. clivicola*: A. Twig × 1.5. B. Old flower × 25. C. Fruit × 12. D. Seed × 25. E. Trichome types: 1. Upper leaf surface × 25. 2. Lower leaf surface × 25. Individual trichomes × 50. A, Ross 8912; B–E, Ross 8802 & Forster.

Affinities: *P. clivicola* is similar to *P. cinerea* Benth. which occurs only in southern New South Wales, but the latter has elliptic leaves with no long trichomes overlying the short dense curved trichomes on the underside of the leaf, and a pubescent style. The other species which it resembles, *P. tropica* Wakef., has larger leaves, denser indumentum of long trichomes on the lower leaf surface, longer sepals and shorter staminal filaments. There is no overlap in distribution of any of these three species.

Conservation status: To date only one population* of the species has been found, comprising c. 20 plants apparently forming two ± even-aged groups, a more numerous one of large shrubs 3–4 m tall intermingled with another of shrubs c. 1 m tall. A narrow secondary road cuts through the middle of the population which is currently not protected by legislation. Any road works, particularly widening of the road, could effectively destroy the population. Its conservation status is therefore assessed as 2V using the criteria of Briggs and Leigh (1988).

Etymology: From the Latin '*clivus*' – slopes and '*cola*' – dweller, alluding to the steep hillside on which the species grows.

Acknowledgements

The assistance of the following people is gratefully acknowledged: the Director and staff of MEL, NE and NSW for efficient processing of loan material; G. Harden at NSW for useful discussions; T.D. Macfarlane, while Australian Botanical Liaison Officer at Kew, for searching for the type of *Ceonothus laniger*; L. Pedley for assistance with the Latin diagnosis; W. Smith for the illustrations; P. Forster for drawing the population of *P. clivicola* to my attention and he and L. Bird for numerous excellent collections of the genus in south-eastern Queensland.

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Accepted for publication 22 February 1990

* **Note in proof:** A second population of *P. clivicola* has been located WNW of Monto. The specimen citation is S.F. 28, Grid ref. 9048-919493, Apr 1990, *Forster* 6713 (BRI,CBG,MEL). This is c. 110 km NW of the previous locality.

Austrobaileya 3(2): 319–321 (1990)

THE RECOGNITION OF SUBSPECIES IN *DENDROBIUM DISCOLOR* LINDLEY (ORCHIDACEAE)

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Summary

Dendrobium discolor **has two different labellum shapes which are geographically correlated. No apparent intergradation of this variation in labellum shape has been observed. The northern populations in Australia and those in New Guinea are given subspecific status as *D. discolor* subsp. *incurvata* D. Liddle & P. Forster.**

Dendrobium discolor Lindley is a commonly encountered lithophytic or epiphytic orchid in coastal areas of north Queensland and parts of New Guinea (Dockrill 1969, Cribb 1986). These authors noted that it is an extremely variable species, especially in the form, size and colour of the flowers. Cribb (1986) detailed the numerous varieties ascribed to this species throughout its taxonomic history. He concluded that "*D. discolor* is in nature, extremely variable. The variation seems more or less continuous rather than disjunct and it is probable that the recognition of so many distinct varieties is unwarranted."

We agree that *D. discolor* is very variable and that recognition of any of the varieties described is unnecessary. However examination of various clones of this species both in their natural habitat and in cultivation reveals that the shape of the labellum (lip of Cribb) may be correlated with geographical origin. Populations originating from Coen and further north all have labellums with narrowly obtuse to acute lateral lobes which either incurve over the column with the upper portions of each lobes touching at the apex (**Fig. 1C–D**) or are erect. Plants from New Guinea with this feature were illustrated by Millar (1978). Populations south of Coen all have labellums with ascending lateral lobes with rounded to broadly obtuse lateral lobes (**Fig. 1A–B**), as illustrated by Dockrill (1969), Jones (1988) and Upton (1989). This distinction is obvious even in pressed herbarium material which we examined at BRI and QRS.

Because this variation can be correlated with the place of origin and is not random, we believe that it is worthy of recognition at the subspecific level.

Examination of the illustration of the type specimen of *D. discolor* shows a plant with broadly obtuse, ascending lateral lobes of the labellum.

Dendrobium discolor Lindley in Edwards, Bot. Reg. 27: t. 52 & misc. 21 (1841). **Type:** cult. *Loddiges* (holo: K, *n.v.*), *fide* Cribb, Kew Bull. 41: 665 (1986).
Dockrill, Austr. Indig. Orchids 1: 468 (1969); Cribb, Kew Bull. 41: 665–667 (1986).

A comprehensive description of the species may be found in Cribb (*loc. cit.*) or Dockrill (*loc. cit.*).

Key to subspecies

1. Lateral lobes of the labellum rounded to broadly obtuse, ascending . . . . . subsp. **discolor**
   Lateral lobes of the labellum narrowly obtuse to acute, incurved with the outer edges touching, or erect . . . . . subsp. **incurvata**

D. discolor subsp. **discolor**

Labellum 12–15 mm long, 11–12 mm wide; lateral lobes rounded to broadly obtuse, 7.3–7.5 mm wide at broadest point, ascending; mid-lobe broadly lanceolate, 5–6 mm long, 6–7 mm wide. **Fig. 1A & B.**

Selected specimens: Queensland. COOK DISTRICT: 0.5 km W of the beach on the track from the beach north of the McIvor River to Starke Stn, 15°07′S, 145°14′E, Jul 1987, *Clarkson* 7283 (BRI); Near banks of Bloomfield River, Nov 1978, *Scarth-Johnson* 791A (BRI); Bloomfield Beach, Sep 1960, *Smith* 11075 (BRI); cult. Mareeba (ex Schnapper Is, off shore from Cape Kimberley), Jul 1989, *Liddle* [AQ456941] (BRI); Limestone Quarry, Big Mitchell Ck, 16°46′S, 145°24′E, Jul 1984, *Gray* 3392 (QRS); cult. Mareeba (ex Daintree), Jun 1988, *Liddle* [AQ429666] (BRI); cult. Mareeba (ex Daintree ferry), Jul 1989, *Liddle* [AQ456947] (BRI). NORTH KENNEDY DISTRICT: Proserpine, Oct 1934, *Macpherson* [QRS044078] (QRS). SOUTH KENNEDY DISTRICT: Mackay, Oct 1887, *Griffith* 87 (BRI). PORT CURTIS DISTRICT: Barren Is, 23°10′S, 151°05′E, *Batianoff* 9648 & *Dillewaard* (BRI); Agnes Waters, 24°14′S, 151°56′E, Aug 1987, *Gibson* N872 (BRI).

Distribution and habitat: Confined to eastern Australia from the McIvor River area north of Cooktown to Agnes Waters in the south. Plants are epiphytic or lithophytic and common on rocky headlands and islands.

Notes: This subspecies has been widely used in the production of interspecific hybrids with the ascending lateral lobes of the labellum remaining a feature of such plants. By comparison subsp. *incurvata* has been little used for producing hybrids for cultivation and considerable potential exists for the production of hybrids with an incurved labellum.

D. discolor subsp. **incurvata** D. Liddle & P. Forster **subsp. nov.** a subsp. *discolore* lobis lateralibus labelli anguste obtusis usque acutis et incurvis partibus superis uterque lobi ad apicem contiguis vel erectis (non ascendentibus) differt. **Typus**: Queensland. COOK DISTRICT: Upper Pascoe River, 12°55′S, 143°00′E, 5 July 1972, *A.W. Dockrill* 471 (holo: QRS; iso: BRI).

Labellum 10–12 mm long, 5.4–6 mm wide; lateral lobes narrowly obtuse to acute, 6–7.4 mm wide at broadest point, incurved over the column and touching at the upper edges or erect; mid-lobe narrowly lanceolate, 4.5–7 mm long, 3–5 mm wide. **Fig. 1C–D.**

Selected specimens: Papua New Guinea. WESTERN DISTRICT: Suki Ck, 8°05′S, 141°10′E, Mar 1968, *Millar* NGF35349 (BRI); Pangoa Airstrip, Lake Murray, 8°05′S, 141°15′E, Mar 1968, *Millar* NGF35425 (BRI); Brown River, Edihu Ck, 9°15′S, 147°20′E, Aug 1970, *Millar* NGF48601 (BRI). CENTRAL DISTRICT: Sogeri, 9°20′S, 150°25′E, Mar 1969, *Millar* NGF40850 (BRI). **Australia, Queensland.** COOK DISTRICT: cult. Mareeba (ex Ida Is), Jul 1989, *Liddle* [AQ456942] (BRI); Bamaga, Aug 1980, *Scarth-Johnson* 960A (BRI); Muttee Head, Jun 1988, *Kenning* [AQ408935] (BRI); Olive River, 12°10′S,14°305′E, Sep 1974, *Hyland* 7418 (QRS); Kennedy Hill Gorge, 12°28′S, 143°16′E, Jun 1989, *Forster* 5405 (BRI); Claudie River, 12°45′S, 143°15′E, Jun 1972, *Dockrill* 446 (BRI,QRS); Lower reaches Claudie River, 12°50′S, 143°20′E, Jun 1972, *Stocker* 886 (QRS); Leo Ck, upstream from falls, on eastern fall of McIlwraith Range, 13°40′S, 143°23′E, Jul 1978, *Clarkson* 2390 (BRI); Rocky River, T.R.14, 13°40′S, 143°25′, Sep 1973, *Stocker* 1060 (QRS); Rocky River, 13°50′S, 143°25′E, Sep 1971, *Stocker* 801 (QRS); cult. Mareeba (ex Coen), Jun 1988, *Liddle* [AQ429663] (BRI); cult. Mareeba (ex Mulingar), Jul 1989, *Liddle* [AQ456940] (BRI).

Distribution and habitat: Southern parts of New Guinea, some associated islands, in eastern Australia from the tip of Cape York Peninsula, south to Coen. Plants may be lithophytic or epiphytic and grow in similar situations to those of subsp. *discolor*.

Notes: There are numerous names at both specific and varietal level in the synonymy of *D. discolor* (Cribb 1986). At least one at species level (*D. arachnanthe* Kraenzl.) and several at varietal level (e.g. *D. discolor* var. *fimbrilabium* H.G. Reichb., *D. discolor* var. *albertisiana* F. Muell.) have types which would probably render them applicable to the new subspecies described above. We have refrained from using any of these names as they are not descriptive of the features emphasized here.

Etymology: The subspecific epithet is derived from the incurved nature of the labellum lobes.

Acknowledgements

The Directors/Curators of BRI and QRS allowed access to plant specimens and use of resources. G. Kenning enthusiastically provided material of various clones. R. Henderson assisted with the Latin diagnosis.

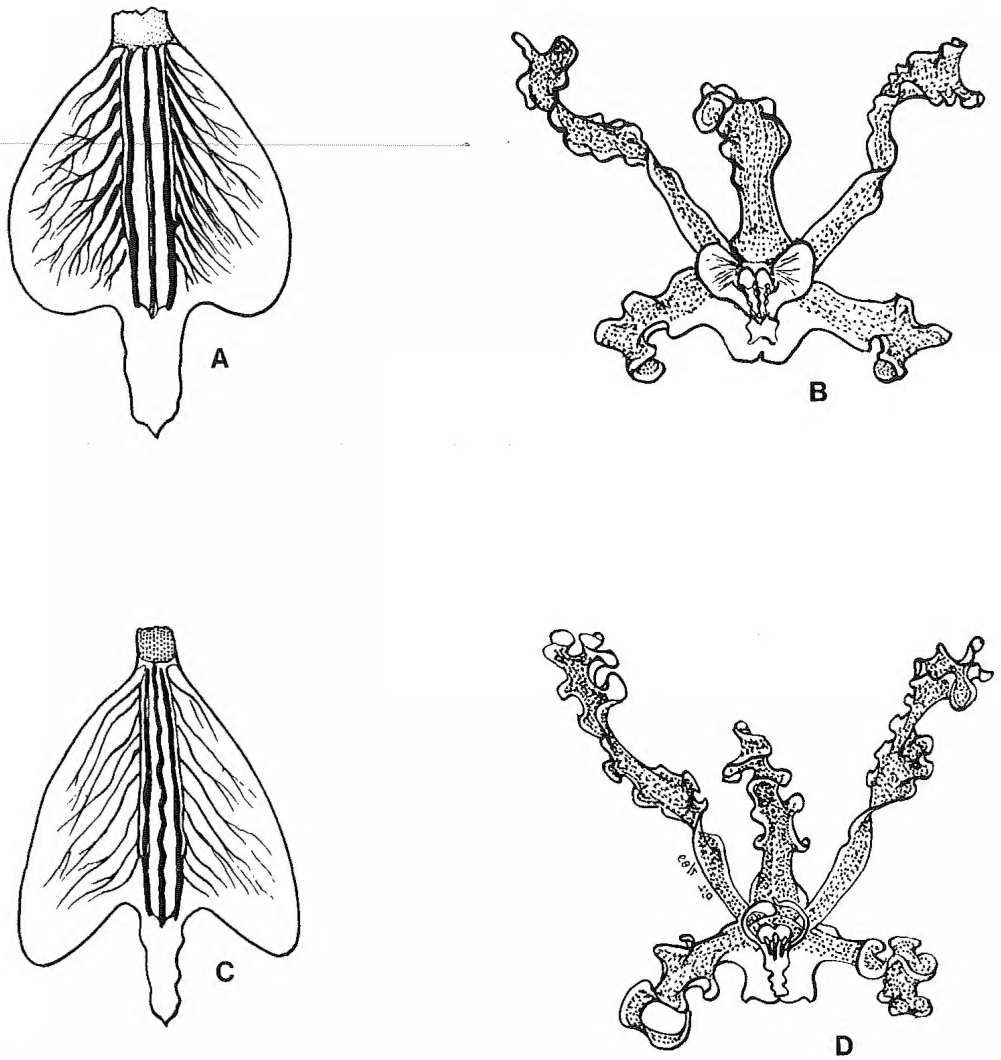

Fig. 1. *Dendrobium discolor* subsp. *discolor*: A. face view of flattened labellum showing rounded lateral lobes, × 2.4. B. face view of flower showing descending lateral lobes of the labellum × 1.1. *Dendrobium discolor* subsp. *incurvata*: C. face view of flattened labellum showing narrowly obtuse lateral lobes × 2.4. D. face view of flower showing incurved lateral lobes of the labellum × 1.1. A,B, from live material of Liddle [AQ456941]; C,D, from live material of Liddle [AQ456940].

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Accepted for publication 8 Feburary 1990

NOTES

Two calicialian lichens new to Australia

During a field trip in Australia by one of the authors (GT), two calicialian lichens, not earlier published from Australia (Tibell 1987) were collected.

Pyrgillocarpon cubanum (Nyl.) Nadv.

For a morphological description, the reader is referred to Tibell (1984). *Pyrgillocarpon cubanum* was earlier only known from the type locality in Cuba where it was collected on smooth bark in a dense tropical rainforest near a small stream.

Specimen examined: Queensland. COOK DISTRICT: Atherton Tableland, 18 km NE of Atherton, c. 4.5 km NE of Tinaroo Falls, just N of Danbulla Forest Drive, c. 500 m N of Tinaroo Falls Dam, 17°09'S, 145°35'E, alt. 680–720 m, 1985, *Thor* 5152 (S).

Tylophoron protrudens Nyl.

For a morphological description, the reader is referred to Tibell (1982). *Tylophoron protrudens* has a wide distribution in tropical to subtropical areas and has been reported from Costa Rica, South America, Africa and Borneo (Tibell 1982). It has recently also been found in the USA (Florida: Thor 1988). In Australia it was collected on smooth bark in a dense tropical rainforest near a small lake.

Specimen examined: Queensland. COOK DISTRICT: Atherton Tableland, 18 km E of Atherton, along the path around Lake Eacham, 17°17'S, 145°37'E, alt. c. 720 m, 1985, *Thor* 5269 (S).

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Accepted for publication 9 August 1989

NOTES

Ceratophyllum muricatum Cham. subsp. *muricatum* (Ceratophyllaceae), a new record for Australia

Until now all authors of treatments of the genus *Ceratophyllum* L. have recognised only one species from Australia, *Ceratophyllum demersum* L., although Aston (1973) suggested that *Ceratophyllum submersum* L. "may eventually be found in Australia, particularly in the north". Wilmot-Dear (1985) apparently did not see Australian specimens of the genus held in Australian herbaria as no Australian herbarium is listed amongst those from which material was borrowed and only one Australian specimen (held at K) is cited. Similarly Les (1986; 1988a; 1988b; 1989) apparently did not borrow material from Australian herbaria for his work on the genus.

Examination of Australian material of *Ceratophyllum*, while preparing the treatment of Ceratophyllaceae for the Flora of Australia project, led to the separation of three specimens, *Henshall* 2036, *Jacobs* 4048 and *Goodrick* 3545 as being distinct from the remainder of the Australian material. These specimens are a good match for a New Guinea specimen, *Brass* 6458, which was cited by Wilmot-Dear (1985) as *C. submersum* var. *echinatum* (A. Gray) Wilmot-Dear and cited by Les (1985) as *C. submersum* L. Les (1989) showed *C. submersum* L. is restricted to Europe, North America and northern Africa and placed specimens from New Guinea, previously included under *C. submersum* L., under *C. muricatum* Cham. subsp. *muricatum*.

Two species are here recognised from Australia, *C. demersum* L. and *C. muricatum* Cham. subsp. *muricatum*.

The important distinguishing features of the two species are summarised in the key below. *C. muricatum* subsp. *muricatum* is found in tropical and subtropical Asia and Africa and in Australia from the three localities given below. *C. demersum* is widespread in most tropical and temperate parts of the world and in Australia is found in northern and eastern coastal and subcoastal areas from near Broome to near Melbourne and along the Murray River.

1. Leaves dichotomously branched 1 or 2 times, occasionally a few dichotomously branched 3 times. Fruits not winged, surface smooth though usually with dark glandular dots . . . . . **C. demersum**

   Leaves dichotomously branched 3 or 4 times. Fruits winged, surface often with raised tubercles . . . . . **C. muricatum** subsp. **muricatum**

C. muricatum subsp. *muricatum*

Specimens examined: Papua New Guinea. *c.* 5 miles [8km] north-west of Hisiu village, Kairuku Subdistrict, Central District, Aug 1962, *Darbyshire* 817 (BRI; G,K *n.v.*); Coast between Oriomo and Fly Rivers, Apr 1936, *Brass* 6458 (BRI; BM *n.v.*). **Australia. Northern Territory.** Barabil Ck, 12°39′S, 132°52′E, Jun 1978. *Henshall* 2036 (DNA,MEL). **Queensland.** NORTH KENNEDY DISTRICT: Bowen, 20°01′S, 148°15′E, May 1981, *Jacobs* 4048 (NSW). **New South Wales.** Deep Creek, Upper Coldstream via Wamarra [28°53′S, 152°46′E], Mar 1968, *Goodrick* s.n. (NSW).

Acknowledgements

The Directors of AD, CANB, CBG, DNA, HO, MEL, NSW and PERTH are gratefully acknowledged for the loan of specimens.

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Accepted for publication 16 March 1990

NOTES

Further notes on *Bertya sharpeana* Guymer (Euphorbiaceae): a significant extension of its range in Queensland.

Until March 1990, Queensland Herbarium records showed that the rare and endemic perennial shrub *Bertya sharpeana* Guymer occurred only at Mt Coolum (26°34′S, 153°03′E) in the Moreton Pastoral District of Queensland. However on 28th February 1990, one of us (SGP) discovered a new population of *Bertya sharpeana* at Sydney Heads (21°25′S, 148°34′E) in the Leichhardt Pastoral District (**Map 1**). Sydney Heads is situated about 75 km south-west of Mackay and 5 km north of Mt Britton, and is about 920 m above sea level. It is isolated and its only access is from Mt Adder road. The geology of the area is volcanic exposed rhyolite. About 50 plants were located in a windswept rocky area c. 50 m × 50 m supporting low open-heath vegetation of *Acacia* spp., *Astroloma* sp., *Leucopogon neo-anglicus*, *Leptospermum neglectum*, *Callistemon pearsonii*, *Pultenaea retusa* and *Banksia spinulosa*.

This species of *Bertya* was first collected at Mt Coolum in July 1966 by Dr A.G. Harold. Unfortunately his original specimen was not retained at Queensland Herbarium. As a result this species remained unknown until Messrs G.N. Batianoff and P.R. Sharpe rediscovered it on 17 September 1981. At this stage the flora of south-eastern Queensland was sufficiently well documented that the specimen was recognised to be an undescribed species.

A detailed taxonomic description is provided by Guymer (1988). Specimens of *B. sharpeana* from Sydney Heads differ from those at Mt Coolum by

(a) Young branches and foliage being noticeably more densely clothed with white stellate tomentum;

(b) Upper surface of leaves retaining many white stellate hairs. (Mt Coolum specimens have mainly tuberculate upper lamina surfaces);

(c) Dried specimens being very sweetly scented (Pearson, field notes).

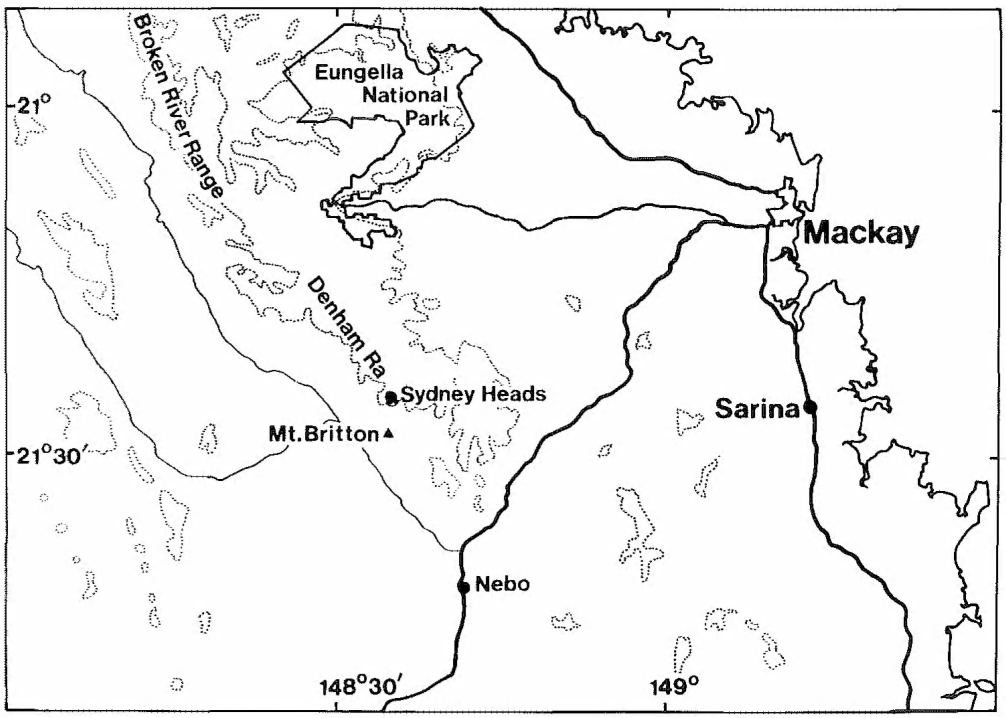
Guymer (1988) described this new taxon as an endangered species occurring only on Mt Coolum. Mt Coolum is a volcanic plug consisting mainly of peralkaline rhyolite also known as comendate (Ewart 1985). The total area of Mt Coolum is about one square kilometre and it is estimated that less than 2% of the area is occupied by *B. sharpeana*. The main population occurs along the south-eastern cliffs some 150 m above sea level. Occasional plants are recorded at the south-eastern base of the mountain and on the northern and western slopes in *Eucalyptus* open-forest, woodland and in the margins of rainforest. However *B. sharpeana* is most abundant in closed-heath, where *Melaleuca nodosa*, *Phebalium woombye*, *Logania albiflora*, *Leptospermum* spp., *Banksia collina* and *Allocasuarina thalassoscopica* are the most common species.

The new locality record necessitates the reassessment of the conservation status of this species from 2E to 3V using the criteria of Briggs and Leigh (1988). Mt Coolum is an area now proposed for an Environmental Park, while the Sydney Heads area forms part of a proposed national park named "Diamond Cliffs". The geology of the two localities from which *Bertya sharpeana* has so far been recorded suggests that the species is endemic to rhyolitic outcrops. These are relatively common in southern and central parts of Queensland (Whitaker & Grimes 1975). It is reasonable to assume that other populations of this *Bertya* may be discovered on these outcrops with more intensive field work. Therefore the code V (vulnerable) is probably now more appropriate.

To date attempts to cultivate this species have not been successful.

Acknowledgements

Thanks are extended to James Elsol for useful comments and Will Smith for preparing the map.



Map 1. Locality of Sydney Heads, Central Queensland.

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Accepted for publication 27 March 1990

CORRIGENDUM

Austrobaileya 3(1) 1989

p. 64 & **p. 66**. The captions for these two illustrations have been reversed. The caption on p. 64 refers to the illustration on p. 66. The caption on p. 66 refers to the illustration on p. 64.

S. R. Hampson, Government Printer, Queensland—1990

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